

Chapter 2

Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the South Shore Project. It describes the three alternatives considered in detail and those eliminated from detailed study. At the end of this chapter the alternatives are presented in tabular format so that the alternatives and their environmental consequences can be readily compared.

Revisions of Chapter 2 for the FEIS

Based on detailed review and comments received on the draft environmental impact statement (DEIS), Chapter 2 has been entirely reorganized for the final environmental impact statement (FEIS); however the changes are in presentation and format only. Much of the information has been consolidated into tables for clarity. There is no substantive change in the project actions as proposed on the ground in any of the alternatives from what was presented in the DEIS. The revised presentation reformatted acreages to be more consistent and comparable between the alternatives and for improved consistency for resource analysis, but they are based on the same treatment units and prescriptions that were the foundation for the DEIS. Definitions for all the activities were revised and expanded to provide greater clarity, but they describe the activities as proposed in the DEIS and do not represent any changes to the methods that are proposed. Some treatment prescriptions that appeared to be separate activities in the DEIS, but were really overlapping have been revised. For example, meadows and SEZ treatments were differentiated in the DEIS, but in the FEIS they are combined because the treatment prescription is the same.

Overall the chapter has been streamlined to first present comprehensive descriptions of the actions proposed in the alternatives followed by the resource protection measures (formerly called design features) that would apply to both of the action alternatives (Alternatives 2 and 3). The background information that was presented in the DEIS Chapter 2 has been moved to Chapter 3 under each resource area. The resource protection measures have been collated into a tabular format by general resource area. Resource protection measures were edited to remove duplication and clarify the objective and intent of the measure. The source reference for each resource protection measure had been added. Appendix C which listed both BMPs and a replication of soil and water related resource protection measures (design features) has been streamlined to include only applicable BMPs from the FS Region 5 BMP handbook. All of the resource protection measures are now included in one place in this chapter.

The analysis of comments on the DEIS (Appendix E) did not lead to the formation of any new alternatives considered in detail. However they did result in some additional information to clarify the alternatives that were considered but eliminated from detailed study (which begins on p. 2-49).

Alternatives Considered in Detail

Three alternatives are considered in detail:

- Alternative 1: No Action
- Alternative 2: Proposed Action
- Alternative 3: Preferred Alternative

Alternative 1 – No Action

Under the No Action alternative, the South Shore project would not be implemented. There would be no landscape level treatment of vegetation and fuels on National Forest System lands in the wildland urban interface (WUI) within the analysis area. Thinning to reduce hazardous fuels, removal of excessive ground fuel, removal of conifer encroachment from meadows, or removal of conifer encroachment from aspen stands would not be implemented as described in the action alternatives. The current conditions of dense stands and high fuel loads would continue to decrease forest health conditions and fire suppression capabilities within the project area.

However, there would be fuel reduction and forest health restoration activities ongoing within the project area under previously approved vegetation management activities. These activities include management of vegetation and fuels on Forest Service urban lots outside of SEZs, restoration of some aspen stands through the Aspen Community Restoration Project, vegetation and fuels treatments in the Big Meadow Creek Watershed Fire Regime Restoration Project, and fuels treatments in the High Meadow Restoration Project. In addition the Angora Fire Restoration Project which includes five major restoration activities: fire and fuels, vegetation and forest health, wildlife habitat, aquatic habitat and stream channel restoration, road and trail delineation and noxious weed detection and removal within the Angora Fire area was approved on July 9, 2010.

No Forest Service System road maintenance activities associated with vegetation and fuels management would occur and only the routine annual road maintenance would continue. Ongoing vegetation management activities would use the existing road system. The three road crossings proposed for reconstruction in the action alternatives would be deferred or not constructed.

Alternative 2 – Proposed Action

This alternative was designed to meet the purpose and need identified in Chapter 1, by:

- Creating defensible space,
- Restoring forest health and resiliency, and
- Restoring SEZs and aspen stands.

It represents the initial proposed action presented during the scoping period. Prescriptions were further refined as a result of scoping for the DEIS. No changes in prescriptions were made in this alternative between the DEIS and FEIS.

In Alternative 2 the Forest Service proposes to treat 320 units totaling approximately 10,670 acres within the 70,581 acres of National Forest System land in the South Shore Project analysis area.

Vegetation Treatment

Initially vegetation (trees and brush) would be thinned using one of the following methods:

- **Mechanical thinning** using:
 - **Whole-tree (WT)** – Whole tree harvesting thins stands by felling and bunching cut trees and larger surface fuels and then skidding the material to a landing. When processed at the landing, the limbs and tops are either chipped for biomass removal or piled to be burned later. Logs are loaded onto trucks for removal.
 - **Cut-to-length (CTL)** - A CTL harvester simultaneously thins stands, processing logs and bunching biomass for removal while traveling over a portion of the limbs and tops from the trees harvested. A forwarder self-loads logs with or without branches for transport to a landing as well as biomass that will be removed from the project area usually in the form of chip. Logs are generally not skidded. A chipper at the landing usually processes material into clean chip for manufacturing into oriented strand boards and biomass utilization.
- **Hand thinning (HT)** - This method involves hand crews using chainsaws to buck and pile surface fuels, cut and pile small diameter fuel ladders, and thin canopy trees (living and dead) up to approximately 20” diameter.

Table 2-1. Summary of Thinning Method Acres Proposed in Alternative 2

	Mechanical Thinning		Hand Thinning	Total
	WT	CTL		
Upland	3620	1463	4855	9938
SEZ	198 ¹	447	87	732 ²
Method Subtotal	3818	1910	4942	10670
Total	5728			

Notes:
¹ Estimate of SEZ inclusions within WT units. These areas would be treated by endlining.
² Includes 290 acres of aspen and meadow treatments.

Implementation Schedule Limitations

An important element to Alternative 2 is how the implementation of the thinning treatments would be spread over time within each of the watersheds. This distribution ensures only a limited number of acres would be treated within a watershed in any given year. This treatment design provides only a maximum limit on thinning activities. There is no minimum limit, as weather, contractor availability, or other unforeseen factors may dictate a slower pace than the maximum possible. It is anticipated that the South Shore Project could take as long as eight years to complete, depending on factors such as funding, weather, operating season and burning conditions. The distribution of treatments across watersheds in the project is analyzed in Chapter 3, Water and Riparian Resources section.

Follow-up Treatments

After vegetation is thinned, follow up treatments to reduce or redistribute residual fuel that was created by thinning, or present prior to thinning, would include the following methods:

- **Lop and Scatter** – A hand method of reducing the upward extending branches from tops and limbs of felled trees to keep slash low to the ground (generally 12” to 18”) and spread out. Material is left or may be a pre-treatment to underburning.
- **Mastication/Chipping** – Uses a variety of rotary or drum cutters that grind and spread remaining surface fuels disconnecting them from the tree canopy. In some areas where access is appropriate chipped material may be removed from the site.
- **Prescribed Fire**
 - **Pile & burn** – Slash created by thinning treatments and existing dead woody debris are stacked in piles with the intent of burning when conditions in an approved burn plan are met, usually two to three years later. Piles are generally distributed throughout a treatment unit. Piles are most often created by hand crews but may be constructed in CTL units by using a grappler attachment to a forwarder (Grapple pile).
 - During pile burning fire is not confined to the pile. Fire is allowed to move through the unit to consume surface fuels that have not been piled.
 - Pile burning is normally conducted as opposed to underburning as an initial fuels treatment due to the high accumulations of fuels generated by thinning.
 - **Underburning** – Also termed broadcast burning, refers to burning residual fuels in place when conditions in an approved burn plan are met.
 - **Landing pile burning** – Woody material that remains on landings is typically machine piled and burned when conditions in approved burn plan are met.

Table 2-2. Estimated Follow-up Treatments Proposed in Alternative 2

Follow up Treatment Method	Associated Thinning Method	Upland Acres	SEZ Acres	Total Acres
Lop & Scatter	WT, CTL, HT	2353	198	2551
Mastication/Chipping	WT, CTL, HT	2480	0	2480
Underburning (lop and scatter)	WT, CTL, HT	850	32	882
Pile & burn	HT	4372	87	4459
Grapple Pile & Burn	CTL	515	0	515
Landings – pile burning and/or removal	WT	128	0	128
Note: In some cases follow up treatment methods may overlap, for example some units may be partially treated by hand piling and also underburned. As a result the acreages shown in Table 2-2 are not additive.				

Follow up residual fuel treatments are prescribed based on the conditions within an individual treatment unit after thinning has been completed. The type of thinning treatment, amount of surface and activity fuels, stand location and topography, air quality, treatment cost, and species composition, were all considered when determining the follow-up treatment. The prescriptions are designed separately from the thinning method to meet fuels treatment objectives and desired conditions, and are therefore not necessarily connected to the thinning method used. The residual fuels are a combination of existing fuel prior to treatment and the fuels generated by the treatment.

The acreage estimates presented in Table 2-2, above, are based on expected fuel loading and conditions after thinning operations. The prescriptions take into account the pre-treatment fuel load and predicted residual fuel post thinning as well as soils, slope, location, remaining vegetation etc. The acreages may change when implemented based on the actual outcome of the thinning and pre-project ground conditions.

While removal of woody biomass would be preferred to burning whenever feasible, there is no way to predict what the biomass market will be at the time this project is implemented. Consequently this analysis assumes all follow up treatments will involve whole tree removal or treating the residual fuels on site in the absence of a market that can utilize the materials.

Roads and Access

Landings – An estimated 219 landings could be used to support the proposed thinning activities proposed in Alternative 2. Approximately 177 of these landings would be constructed on previously used landing sites. Landings would average less than one acre but would not be larger than two acres. Generally landings used for WT operations tend to be larger than CTL operations. Existing vegetation would be removed from the landing site and piled for later burning.

System Road Management – Alternative 2 would use 26.7 miles of existing System roads. Of the System roads used, 11.7 miles would receive maintenance activities which generally include minor drainage maintenance, surface repair, and brushing. The remaining 15 miles would need reconstruction. Reconstruction includes maintenance activities plus activities such as, replacement of inadequate drainage crossings, elimination of ruts, ditch repair, and installation of waterbars and dips to provide adequate runoff. Roads proposed for reconstruction are either Maintenance Level 1 or 2. At the conclusion of the project all FS System roads would be left in a condition consistent with the assigned Maintenance Level as prescribed by the Forest Development Road Plan.

Temporary Roads – Alternative 2 would propose to construct 13.6 miles of temporary road. Of the total mileage proposed, 8.8 miles is on old existing road prisms and only 4.8 miles requires new construction.

Temporary road construction involves the following activities:

- **Vegetation removal:** Light brush, small trees, and grasses would usually be removed by equipment such as dozers or graders. Larger trees and brush would require hand removal and piling for disposal. Clearance limits would generally allow one-way passage for equipment and trucks, but would not be cleared beyond the original road prism when one exists. In general, temporary roads would not have constructed turnouts to accommodate two-way traffic. Traffic control measures such as radio communications would be utilized
- **Grading:** For new temporary roads, the road prism would be graded by equipment. Generally, the road would be outsloped to ensure that effective drainage is maintained. For temporary roads that follow existing old road prisms, obstacles such as ruts, water bars, leadoff ditches, and pronounced dips would be graded out to make the road suitable for equipment and truck traffic.
- **Drainage:** Facilities such as culverts or fords would be installed to accommodate the free flow of drainages and ditches. Dips and leadoff ditches, with energy dissipaters as needed, would be installed to facilitate occasional thunderstorm runoff. If vegetation at the end of leadoff ditches

and dips is not sufficient to disperse sediment loads, rock or slash would be placed to adequately disperse sediment loads.

Temporary road stream crossings would be needed in 28 locations on ephemeral channels, and one temporary crossing on an intermittent channel. The number of stream crossings and the type of stream channel that would be crossed are given for each watershed below:

Angora Creek	2 ephemeral crossings
Camp Richardson Frontal	1 ephemeral crossing
Grass Lake	2 ephemeral crossings
Headwaters of Trout Creek	1 ephemeral crossing
Lower Trout Creek	1 ephemeral crossing
Lower Upper Truckee River	3 ephemeral crossings
Middle Upper Truckee River	1 ephemeral crossing
Osgood Swamp	3 ephemeral crossings
Saxon Creek	1 intermittent and 1 ephemeral crossing
Tallac Creek	4 ephemeral crossings
Taylor Creek	9 ephemeral crossings

Temporary roads would be constructed, used then decommissioned at the conclusion of use. Temporary stream crossings would be constructed, used then decommissioned within one season, except the Saxon Creek intermittent crossing. No temporary roads are proposed for inclusion into the FS System. Decommissioning would use a variety of actions but would leave the road impassible to vehicles, and hydrologically stable (see resource protection measures).

Crossing and Culvert Replacement - Alternative 2 proposes the replacement of three existing permanent stream crossings that are currently acting as fish passage barriers, sediment conveyance barriers, and/or sediment sources. One of these is on an intermittent channel in the Lower Trout Creek watershed (12N01A), one is on an ephemeral channel in the Cold Creek watershed (12N08), and one is on a perennial channel in the Osgood Swamp watershed (12N20).

Forest Service System Road 12N01A

The existing crossing on Forest Service System road 12N01A over an intermittent tributary to Saxon Creek in the Lower Trout Creek watershed is acting as a flood passage barrier, is causing erosion immediately downstream, and has caused aggradation upstream. This crossing replacement also reduces the need for temporary roads by 0.7 mile. The replacement crossing design would meet the following specifications:

- The crossing would be constructed in the fall, during drier channel and meadow conditions to prevent direct impacts to this tributary or to Saxon Creek. Because the channel and meadow would be relatively dry during installation, dewatering and diversions are not expected to be necessary.
- If groundwater is intercepted during construction, it would be pumped to adjacent upland areas.

- The crossing would be designed to support the weight of the crossing and its intended use by thinning and fire suppression equipment.
- Excavation in the flood plain would be required to remove the existing fill and connect the foundation of the road with the crossing to support equipment and hauling trucks. The removed fill would be replaced with granular material meeting Forest Service specifications to support the weight of the crossing and the intended use (BMP 2-17).
- The proposed design for the new channel crossing is for multiple arched culverts spanning the entire width of the floodplain. The culvert in the center of the crossing (where a channel has formed downstream of the road) would be the largest, and is designed to pass the bankfull flow volume. Surrounding the culverts would be gabion baskets filled with small boulders, which would also be permeable to water flow. Substantial excavation in the floodplain would be required to remove the existing fill and to construct the foundation of the road crossing to support hauling trucks. The removed fill would be replaced with granular material that would no longer restrict flood flows across and through the road. Other designs, such as a series of pre-fabricated bridge segments with gabion basket supports filled with small boulders permeable to water flow may be considered if they meet the criteria above and would reduce impacts to the SEZ.

Powerline Road (12N08)

The ephemeral channel crossing replacement in the Cold Creek watershed is along Powerline Road (12N08). The existing crossing consists of a 24" round culvert with cement bag headwalls and side walls, and presents a problem for access by equipment needed for South Shore treatments. The road fill over the crossing is minimal, less than 2 ft. The current crossing entry slope is approximately 15% grade coming from the south and the exit slope is about 20% grade. These slopes are too steep for haul trucks to access the treatment areas beyond this crossing. The new culvert crossing would consist of a 48" corrugated metal culvert and approximately 5 ft. of fill to bring the road grade at the crossing to an acceptable height for haul trucks to pass the entry and exit slopes. This fill would be excavated primarily from the road alignment on either side of the crossing, with some excavation coming from the land adjacent to the road to lessen the slopes on either side of the road prism. In order to reduce the amount of fill needed for this culvert replacement and road upgrade, headwalls would be used to maintain the road width through the crossing. Additional drainage features may be necessary since the incised road segment would increase in length after excavating the required fill. These would be constructed according to Forest Service plans and specifications. Any areas disturbed by excavation or filling for the road crossing replacement would be covered with chipped or masticated material to prevent exposed soil. In addition, drainage features would be constructed such that exposed soil does not result (BMP 2-17).

Forest Service System Road 12N20

In the Osgood Swamp watershed, an existing crossing on Forest Service system road 12N20 at the end of Nez Perce Street has a vented ford with crushed pipes that is no longer functioning to pass the flow of the channel and is too narrow to allow equipment to cross without causing resource damage. Currently, this crossing is causing upstream aggradation and preventing fish passage. Prior to using this stream crossing for South Shore Project implementation, the stream crossing would be replaced. The new culvert would be a bottomless arched culvert, or suitable alternative, designed to pass the 100-year flood flow of the channel and to allow for unobstructed fish passage. This channel is a spring fed perennial stream that would require dewatering and

flow diversion around the site during culvert replacement. The following specific installation criteria would reduce effects to water quality (BMP 2-15 and BMP 2-17):

- A diversion channel would be created adjacent to the stream channel and be lined with a synthetic material to avoid direct ground contact
- Cofferdams would be installed at the upstream and downstream ends of the culvert.
- Once water backs up sufficiently behind the upper coffer dam, gravity flow would move water into the diversion and around the crossing to the stream reach immediately downstream of the lower coffer dam;
- Any remaining water in the culvert replacement area, and intercepted ground water, would be pumped to nearby upland areas;
- Pumps would be kept onsite throughout crossing installation to maintain a water-free construction zone.
- Once the construction area is free of standing water, the existing culvert and unsuitable materials (i.e., organic soil) would be removed, and the new bottomless arched culvert would be installed with its footings extending below the existing channel to allow for a natural material bed.
- Fill would be placed around and over the new culvert to connect the existing road surface elevation with the culvert crossing.
- Prior to allowing the channel flow back into the downstream reach after crossing replacement, water would be pumped to upland areas until the water quality is acceptable for discharge into the stream channel.

Treatment Prescriptions

Rationale Used in Developing Alternative 2

Within the South Shore Analysis Area, the units that were identified for treatment are overly dense forest stands with surface fuel accumulations at levels greater than desired conditions. Open stands with little fuel accumulations that meet the desired conditions described below would not be treated.

The treatment prescription for any individual unit including the thinning method and follow up treatments proposed are based on soil type, slope, associated water quality protection, access, habitat conservation or other protection needs. Application of the treatment methods are guided by project desired conditions and modified by the resource protection measures described later in this chapter.

Stand density index (SDI) allows for a direct comparison of density between stands by creating a comparable index. SDI converts a stand's current density into a density at a constant reference size of 10 inches dbh. An SDI of 400, for instance, would represent 400 trees per acre (TPA) that are 10 inches at dbh, or 132 TPA that are 20 inches dbh. Trees are able to withstand drought conditions better when at lower stand densities with sufficient available growing space and resources and when inter-tree competition does not have a large effect on stand growth (Long 1985). For the South Shore project, maximum SDI is used for analysis in determining stand density conditions for each alternative. The desired stand densities for overall forest health objectives as measured in SDI is about 40% of the maximum. In order to implement appropriate stand density levels, basal area as measured in square feet per acre, was also used in correlation with the desired SDI levels.

Basal area is the cross sectional area of a tree bole measured at diameter at breast height (dbh), which reflects varying levels of stand densities depending on a stand's average diameter. Basal area is used as a measure of stand density which corresponds to forest health issues such as mortality due to competition among trees as they fight for water and soil nutrients, and susceptibility to insect and disease outbreaks.

To meet the desired condition, the objectives of the treatment are to reduce the current stand density of approximately 160 to 350 ft² basal area per acre by removing live understory trees to achieve a residual stand density of 80 to 150 ft² basal area per acre. When basal areas exceed levels of about 150 ft² per acre, bark beetle populations are more likely to expand into outbreak levels, killing a large number of trees (Fettig et al. 2007). Optimal levels at which infestation is less likely would be approximately 80 ft² per acre.

Basal area is used as a measure for implementation in the mechanical units. The hand thinned units, however, use the associated number of trees per acre (tpa) that should be left as residuals to meet the desired density levels.

Fuel models (Anderson, H.E, 1982) are used to estimate fire behavior, are applied when using some fire behavior models, and used as a tool for determining fuels treatments. Stands that have representative fuel models with fuel loads that are less than 6 tons per acre in the 0" to 3.0" size classes tend to have a surface fire type of fire behavior with low to moderate torching.

Objectives of the treatment are to remove surface fuels, such as down trees, to achieve a maximum residual surface fuel load of 10 tons per acre. In areas where stream zones or other wildlife habitat require a higher component of large down wood, a maximum of 15 tons per acre is acceptable. The desired fuel loading of 10 tons per acre is based on having up to approximately 4 tons per acre in the 0" to 3.0" size classes and allowing for approximately 6 tons of larger down logs per acre.

This range is also described as the “optimum of coarse woody debris for providing acceptable risks of fire hazard and fire severity while providing desirable quantities for soil productivity, soil protection, and wildlife needs” (Brown et al, 2003).

Guidelines

In attaining the above objectives a number of guidelines were applied to each treatment unit to create the prescriptions proposed in Alternative 2. The guidelines are listed below and are organized by activity. Direction for uplands is separated from SEZs because the treatment methods are identifiably different and these are typical landform delineations in the Lake Tahoe basin environment.

The guidelines section is organized under the following headings.

- Uplands
 - Mechanical Thinning
 - Hand Thinning
- Stream Environment Zones
 - Mechanical Thinning
 - Hand Thinning
 - Aspen Treatments
- Wildlife Areas
- Prescribed Fire
- Mastication and Chipping
- Lop and Scatter

Uplands

Mechanical Thinning Units

- Mechanical treatments would be used to reduce upland hazardous fuels on slopes less than 30%.
- Live tree density would be reduced through thinning understory trees. Primarily suppressed and intermediate crown class trees, along with some co-dominant trees, would be removed to reduce competition and improve vigor and growth of residual trees, enabling them to better resist fire, insect attacks, and disease. Selection of trees to be thinned would begin with removal of the smallest trees (suppressed and intermediate trees) and continue to trees of increasing diameter until the desired fuel reduction and forest structure are reached.
- Jeffrey pine and sugar pine would be favored for retention.
- Snags and down logs would be removed as necessary to meet fuels objectives, retaining the largest snags and down logs present to meet Forest Plan wildlife requirements.
- To achieve the desired conditions for fuel loads, stand densities, and forest structure, live and dead trees removed would range between 3 to 30” diameters at breast height (dbh). In some situations trees larger than 30” dbh might need to be removed for equipment operability and safety.
- The type of mechanical equipment used for thinning and removal operations would depend on vegetation removal needs and operational feasibility. They would include WT using mechanical harvesters and whole tree skidding, and CTL harvest with log-forwarding operations. Treated material could be removed either as saw logs (whole tree or cut-to-length), fuelwood, or biomass.
- Treated material not removed would be processed on site through prescribed burning, chipping, or mastication. Masticated or chipped material would be spread over the treatment area, with a maximum depth of approximately 6” for chips.

Hand Thinning

- Hand treatments would be used to reduce hazardous fuels on slopes greater than 30%, where mechanical ground-based systems are limited by operability constraints (access, excessive moisture, rocks, etc.) (BMP #5-2).
- Live tree density would be reduced through thinning understory trees where mostly suppressed and intermediate crown class trees, along with some co-dominant trees, would be removed to reduce competition and improve vigor and growth of residual trees, enabling them to better resist fire, insect attacks, and disease.
- Jeffrey pine and sugar pine would be favored for retention
- For hand thinning treatments, live trees up to 20" dbh would be removed based on achieving the desired stand densities and fuel loads. The portion of a felled tree that is greater than 14" dbh would be left on site while the remainder would be included in on site hand piles for later burning.
- Where current fuel loads are predicted to remain above desired levels after thinning and follow-up treatment (e.g. prescribed burning), multiple entries may be required to bring the areas into the desired condition. Approximately 1,287 acres of hand thinning treatments may require multiple entries as part of this project.
- Dead trees removed would range up to 20" dbh, and down logs would range between 3" to 20" in diameter.
- Hand thin units, in both uplands and SEZs (not wildlife areas) would be thinned to approximately 70 to 100 trees per acre. Wildlife areas would leave up to 160 trees per acre in order to maintain wildlife habitat.

Stream Environment Zones (SEZ's)

Mechanical Thinning

- Mechanical equipment operations in SEZs would be limited to CTL or operations using equipment that has been demonstrated to adequately protect soil and water resources (i.e. equipment that is lighter on the land, rubber-tired equipment, equipment that operates on a bed of slash, or other innovative technologies that reduce impacts to soils) (BMP 5-3).
- SEZ units that exhibit equal or less sensitivity than the Heavenly Valley Creek SEZ demonstration project (HSEZ) site, based on the Sensitivity Rating System (Appendix D), may be treated with ground-based equipment with operable soil moisture conditions (see Soil, Water and Riparian resource protection measures).
- SEZ units that rate more sensitive than the HSEZ site would be treated by hand thinning, endlining, or mechanical over-snow operations.
- When units are rated more sensitive than the HSEZ site, but only a portion of the unit is responsible for the high sensitivity rating, the less sensitive part may be treated with mechanical equipment, but the sensitive portions of these units would be treated by hand crews, endlining, or mechanical over-snow operations. Areas with wet soils or other sensitive features would be flagged for hand treatment prior to commencement of mechanical operations.
- To achieve the desired conditions for fuel loads, stand densities, and desired stream shading, trees removed would range between 3 to 30" dbh, beginning with the smallest diameter and retaining the largest trees. Treatments would include the removal of primarily understory, and some overstory trees, in order to retain stream shading, and reach the desired residual stand density and wildfire behavior. In some situations trees larger than 30" dbh might need to be removed for equipment operability and safety.

- Snags and down logs would be removed as necessary to meet fuels objectives, retaining the largest snags and down logs present to meet Forest Plan wildlife requirements.
- Basal areas greater than 150 ft² may be prescribed where needed to maintain desired stream shading.
- Jeffrey pine and sugar pine would be favored for retention, as well as desired riparian species, such as aspen and willow.
- If feasible, treated material would be removed as saw logs, fuelwood, or biomass.
- Fuel material not removed may be treated on site through prescribed burning.
- To provide ground cover and protect soil resources in areas of ground disturbance, including forwarding trails and temporary roads, activity slash would be left, or masticated, or chipped and spread over the disturbed areas, with a maximum depth of approximately 4”.



Figure 8. Example of cut to length mechanical SEZ treatment. Heavenly SEZ Demonstration project. Location: Pioneer Trail at Al Tahoe Blvd, South Lake Tahoe.

Hand Thinning

- Hand thinning in SEZs would include the same treatments as described for hand thinning in uplands to remove primarily understory, and some overstory trees based on the desired residual stand density and expected wildfire behavior.
- Basal areas greater than 150 ft² may be prescribed where needed to maintain desired stream shading.
- Where feasible ground fuels exceeding 15 tons per acre would be removed from the 50-foot piling exclusion buffer around lakes and perennial and intermittent stream channels and be treated by hand piling and burning outside the piling exclusion buffer.

Aspen Treatments

Aspen stands are unique habitat components of SEZs. For the South Shore project there are approximately 290 acres of aspen stands that are included in the SEZs proposed for treatment. In addition to the objectives listed above for mechanical and hand treatments in SEZs, the following guide treatments for aspen stands.

- For aspen units where lodgepole pine and other conifer species are encroaching, the prescribed treatment would include the removal of live conifers to increase the amount of hardwood vegetation that currently exists to restore aspen species dominance.
- The general prescription for hand treatments would primarily include removing all live and dead conifers up to 20" dbh. All down conifers up to 20" dbh would also be removed.
- Mechanical treatments could include the removal of all conifers up to 30" dbh with the exception of trees greater than 150 years old exhibiting characteristics such as flat tops, large limbs, and large bark plates. Prescribed burning in aspen stands post-thinning could also be included for treatment.
- Vegetation treatments proposed within aspen units would result, where possible, in the following desired conditions:
 - average conifer crown closure less than 25%;
 - average aspen crown closure greater than 40%;
 - aspen crowns comprising more than half the canopy;
 - aspen crowns overtopping conifer crowns;
 - aspen regeneration (approximately 500 stems per acre) occurring or likely to occur within 3 to 5 years;
 - conifer encroachment not likely to occur or minimal within the next 15 years.
- Burning piles in aspen would be avoided when possible to minimize risk of mortality to aspen roots and trees and the risk of reducing site suitability for aspen growth and regeneration (e.g., killing live roots or inducing soil hydrophobicity).
- The LTBMU/Rocky Mountain Research Station (General Technical Report) GTR-178 "Ecology, Biodiversity, Management, and Restoration of Aspen in the Sierra Nevada" (Shepperd et al. 2006) and findings of the Aspen Community Mapping and Assessment Project would be used in developing site-specific vegetation treatment recommendations for aspen habitat within the proposed action area. Integrated project design includes the site-specific resource protection measures for aspen.

Wildlife Areas

This section describes the guidelines for what collectively are called “wildlife areas” in the South Shore project. They include California spotted owl protected activity centers (PACs) and Home Range Core Areas (HRCAs), northern goshawk PACs, TRPA disturbance zones for northern goshawk and osprey, and TRPA bald eagle wintering habitat. Wildlife areas include both upland and SEZ landscapes. Treatments within wildlife areas would include both mechanical and hand methods to achieve the guidelines described below.

- Vegetation treatments within northern goshawk PACs, within California spotted owl PACs, and within TRPA goshawk disturbance zones would result in at least: 1) two tree canopy layers; 2) dominant and co-dominant trees with average diameters of 24” dbh; 3) 60 to 70 percent canopy cover; 4) an average of five to eight snags (five in eastside pine and mixed conifer, six in westside pine and mixed conifer, and eight in red fir forest types) per acre larger than 20” dbh and of variable decay classes; and 5) approximately 5 logs larger than 20” in diameter (at the large end) and of variable decay classes, totaling 10-12 tons of coarse woody debris (CWD) per acre. These conditions would be met where possible, otherwise as closely as possible.
- Vegetation treatments within California spotted owl home range core areas (HRCAs), would result in at least: 1) two tree canopy layers; 2) dominant and co-dominant trees with average diameters of 24” dbh; 3) 50 to 70 percent canopy cover; 4) an average of three to six snags (three in eastside pine and mixed conifer, four in westside pine and mixed conifer, and six in red fir forest types) per acre larger than 20” dbh and of variable decay classes; and 5) approximately 4 logs larger than 20” in diameter (at the large end) and of variable decay classes, totaling 8-10 tons of coarse woody debris (CWD) per acre. These conditions would be met where possible, and otherwise adhered to as closely as possible (as available material).
- Vegetation treatments within osprey stands adjacent to Fallen Leaf Lake and Lower Echo Lake would result in: 1) retention of all known standing osprey nest trees; and 2) for future nest tree recruitment the retention of an average of three trees per acre that are larger in diameter and taller than the dominant tree canopy, with an emphasis on dead topped trees with robust, open branch structures. These conditions would be met as closely as possible.
- Vegetation treatments within the TRPA bald eagle wintering habitat area near Taylor Creek and Tallac Creek adjacent to wetland, wet meadow, and open water habitats that result in: 1) late successional forest type, with an emphasis on Jeffrey pine-dominated stands; 2) retention of trees that are larger in diameter and taller than the dominant tree canopy, with an emphasis on trees greater than 40” dbh and greater than 98 feet tall and on dead topped trees with robust, open branch structures; 3) an average of six snags per acre larger than 20” dbh and of variable decay classes. These conditions would be met where possible, otherwise as closely as possible.

Prescribed Fire

- Piling of existing surface fuels and activity fuels for follow-up burning would occur primarily in units treated with hand thinning. Machine piles may also be created in some areas of the mechanically thinned (CTL) units.
- Piles would be located outside of designated exclusion zones and modified piling specifications would be applied in areas where piling is allowed within SEZs.
- Only hand piling would occur within SEZs, no machine piling.

- Prescribed burning would be used for reducing fuel loads in excess of maximum desired levels of 10 tons per acre. Up to 15 tons per acre would be acceptable in SEZs or wildlife areas.
- Lop and scattering of fuels followed by a prescribed underburn would occur in some of the mechanically thinned (WT) units.
- Prescribed pile burning and underburning would only occur under approved conditions as described in a Burn Plan that is approved for that area by the line officer.
- Scorch to residual trees is expected and mortality of up to 15% is acceptable.



Figure 9. Example of prescribed fire, pile burning, after treatment. Location: Slaughterhouse Canyon, East Shore Lake Tahoe, NV.

Mastication and Chipping

- Mastication or chipping would be applied primarily to the CTL units for treating surface and activity fuels. Areas within hand thinned units that have access and where slopes are less than 30% would also be treated with mastication or chipping.
- Mastication or chipping would only occur where fuel loads would not exceed 10 tons per acre or 15 tons in SEZs or wildlife areas.

Lop and Scatter

- Lop and scatter would be applied primarily to the units treated with whole tree logging operations.
- Lop and scatter would only occur where fuel loads would not exceed 10 tons per acre or 15 tons in SEZs or wildlife areas, unless followed-up with a prescribed underburn.
- Lop and scatter would not exceed 18 inches depth.

Alternative 3 – Preferred Alternative

Alternative 3 is a modification of Alternative 2 (the Proposed Action) in response to public and other agency comments received during scoping expressing concerns regarding watershed impacts and impacts within Northern goshawk and spotted owl PACs (Issues, Chapter 1)

Alternative 3 uses the same thinning method options, follow up treatments and treatment prescriptions as Alternative 2 but prescribes changes to where the treatments are applied on the ground based on the rationale presented below. Three combinations of treatment changes were used to arrive at Alternative 3. These include the following:

- 1) from WT methods to CTL methods, hand treatments, or no treatment;
- 2) from CTL to hand treatment or no treatment, and
- 3) from hand treatment to no treatment.

Compared to Alternative 2, Alternative 3 treats 558 fewer acres total (10,112 acres). In addition Alternative 3 proposes 1,045 acres more hand treatments, 100 acres more CTL, but 1,677 acres less WT treatments. Up to 442 more acres may require more than one entry to bring the areas into the desired condition due to high fuel loads and densities of small trees.

Vegetation Treatments

The table below summarizes the acres by treatment type proposed in Alternative 3 as a result of the rationale described in Table 2-3, and based on field review, data review, and fire behavior modeling. The differences between Alternative 2 and Alternative 3 are compared at the end of this chapter.

Table 2-3. Summary of Thinning Method Acres Proposed in Alternative 3

	Mechanical Thinning		Hand Thinning	Total
	WT	CTL		
Upland	1971	1625	5823	9419
SEZ	170 ¹	385	138	693 ²
Method Subtotal	2141	2010	5961	10112
Total	4151			
Notes: ¹ Estimate of SEZ inclusions within WT units. ² SEZ acres include aspen treatment acres.				

Implementation Schedule Limitations

The same implementation schedule concept was used for Alternative 3 as was described in Alternative 2, when describing the timing of treatments within watersheds. As a result of changes in thinning method prescriptions that reduce risk to watersheds, the maximum treatment acres for each HUC7 watershed were revised for Alternative 3, to account for changes in treatment type acres. For example, a conversion of more treatments to hand thinning, and a reduction in overall treatment acres, adjusted the maximum acres available for treatment in a given year. The distribution of treatments across watersheds for this alternative is analyzed in Chapter 3, Water and Riparian Resources section.

Follow up Treatments

As described in Alternative 2, follow up residual fuel treatments are assigned based on individual treatment unit requirements after thinning has been completed to meet fuels treatment objectives and desired conditions, and are therefore designed independently from the thinning method used. In some cases follow up treatment methods may overlap, for example some units may be partially treated by hand piling and also broadcast burning. As a result of changing where the thinning methods are applied on the ground there is a corresponding change in the estimated acres where the different residual fuels removal methods would be applied. Table 2-4 shows the estimated acres by method and landscape type.

Table 2-4. Estimated Follow-up Treatments Proposed in Alternative 3

Follow up Treatment Method	Associated Thinning Method	Upland Acres	SEZ Acres	Total Acres
Lop & Scatter	WT, CTL, HT	1616	170	1786
Mastication/Chipping	WT, CTL, HT	2617	0	2617
Underburning (lop and scatter)	WT, CTL, HT	774	28	802
Pile & burn	HT	5217	138	5355
Grapple pile & Burn	CTL	374	0	374
Landings – pile burning and/or removal	WT	77	0	77

Roads and Access

As a result of changes in the treatment prescription from Alternative 2 the need for temporary roads and landings would be reduced in Alternative 3. The reconstruction of three crossings described in Alternative 2 does not change.

Landings – An estimated 168 landings would be needed to support the proposed thinning activities proposed in Alternative 3. This is 50 less than Alternative 2.

System Road Management – Alternative 3 would use the same 26.7 miles of existing system roads as Alternative 2 but fewer miles of road would need reconstruction and more miles would need only maintenance than Alternative 2. Of the FS System roads used, 15.7 miles would receive maintenance activities and the remaining 11.0 miles would need reconstruction.

Temporary Roads – Alternative 3 would construct 12.3 miles of temporary road. The reduction of temporary roads is a consequence of fewer WT units proposed in Alternative 3. Of the total mileage proposed 6.5 miles is on old existing road prisms and only 3.3 miles requires new construction. Decommissioning of temporary roads and stream crossings would be the same as in Alternative 2. Ephemeral and intermittent crossings are unchanged from Alternative 2.

Crossing and Culvert Replacement - Alternative 3 proposes the replacement of the same three existing permanent stream crossings as described under Alternative 2. One of these is on an intermittent channel in the Lower Trout Creek watershed (12N01A), one is on an ephemeral channel in the Cold Creek watershed (12N08), and one is on a perennial channel in the Osgood Swamp watershed (12N20).

Rationale Used in Developing Alternative 3

Overall the same desired conditions, objectives and guidelines used in Alternative 2 were applied to create Alternative 3. They were employed in a slightly different configuration on the ground as shown in the tables above in response to the two issues described in Chapter 1, Watershed Impacts and Wildlife areas.

Watershed Impacts

Alternative 3 was formulated to respond to comments during scoping to create an alternative with fewer or reduced proposed activities in sensitive areas. Changes from Alternative 2 were made on a site-by-site basis and were made based on a variety of interdisciplinary factors such as soils, erosion hazards and terrain limitation and not any singular set of evaluation criteria. The results are presented in the tables above.

Wildlife Areas

Changes to treatments aimed at reducing impacts to sensitive species and their habitats were proposed in Alternative 3 based on the following: spatial extent of northern goshawk and California spotted owl PACs, WUI zone (defense or threat), type of treatment proposed (mechanical or hand), stand survey data, and type of fire behavior predicted (using FARSITE, FLAMMAP, and FVS models).

In the WUI defense zone, proposed treatments were evaluated within spotted owl and goshawk PACs based on stand survey data and stand-by-stand predicted fire behavior within each PAC.

- Where a crown fire (conditional, passive, or active) was predicted for a stand, the PAC treatment prescription for fuels reduction detailed in Alternative 2 remain the same in Alternative 3.
- Where a surface fire was predicted for a unit, no treatment within the PAC is proposed in Alternative 3. Surrounding unit treatments were not changed; PAC boundaries were not adjusted.

In the WUI Threat Zone, proposed treatments were evaluated within spotted owl and goshawks PACs based on the factors of feasibility of implementing prescribed fire, and stand survey data and predicted fire behavior at the landscape level.

- Where the overall landscape fire and fuels strategy would be compromised, the level of treatments necessary for fuel reduction under the PAC prescription detailed in Alternative 2 remain the same in Alternative 3.
- Where fire behavior modeling indicated the landscape fire to be a surface fire, no treatment within the PAC is proposed in Alternative 3. Surrounding unit treatments were not changed; PAC boundaries were not adjusted.

Review of the suitable habitat available for other sensitive species, such as osprey and bald eagle, resulted in a reduction of treatments in habitat acres as detailed in the alternative comparison section below. Some of these changes were the result of overlap with PAC habitat for California spotted owls or goshawks, overlap with other resources such as sensitive plants, or changes to SEZ treatments.

The number of PACs, HRCAs, and TRPA disturbance zones within the project analysis area remain the same for both action alternatives; there are 16 northern goshawk PACs and nine California spotted owl PACs/HRCAs in the project analysis area. However, Alternative 3 reduces the number of both goshawk and spotted owl PACs that would be treated compared to Alternative 2.

Resource Protection Measures

Resource protection measures are intended to avoid, eliminate or reduce unintended and undesirable effects of the proposed activities. The following tables display the resource protection measures categorized by resource area. The resource protection measures apply to both Alternative 2 and 3 but some may be specific to units. The last column references the related BMP and/or source of the protection measure if it contains direction from applicable policy or management direction. *(Note: The DEIS used the term “design feature”. However, the term “resource protection measure” is more descriptive of the purpose of the direction contained in this section so it has been incorporated into the FEIS.)*

Changes from the DEIS – The resource protection measures have been edited from the version presented in the DEIS. They have been compiled in tabular format and numbered for ease of reference. Duplicative measures have been removed. The Soils section has been combined with the Water Quality section to eliminate much of the duplication in the DEIS. Appendix C has been revisited to include only the text of R5 BMPs. The replication of resource protection measures found in the DEIS was removed from that Appendix. In the FEIS all measures are listed here in this section. Some of the measures were edited to provide clarity where public comment indicated the intent of the measure was not well understood.

Air Quality

Goal:

- Follow agency and air resource board smoke management requirements.

I. Air Quality- General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
AQ-1	Scheduling of prescribed burn activities would comply with air quality standards and restrictions	Project Wide	NAAQS, CARB, EDAQMD

Pest Management

Goal:

- Prevent introduction and spread of annosus root disease.

II. Pest Management - General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
P-1	<p>Live true fir and pine tree cut stumps 14 inches diameter and greater would be treated with an EPA registered borate compound (Sporax), which is registered in California for the prevention of annosus root disease.</p> <ul style="list-style-type: none"> • Sporax would be applied to conifer stumps within 24 hours of creation. • Sporax would not be applied within 25 feet of standing or running water. • Sporax would not be applied in flag and avoid areas to protect threatened, endangered or sensitive plants. • Sporax would not be applied during precipitation events. 	Project Wide	FSH 3409.11 SNFPA S&G 97

Focal Wildlife Species

Goals:

- Wildlife objectives and resource protection measures for this project are centered on land allocations to address regional and forest management direction; disturbance zones to address TRPA wildlife resource management provisions; and ecosystem types to address the interconnectedness of natural resources within the primary objective of the project (hazardous fuels reduction). The project would affect vegetative characteristics of focal wildlife species habitats on the forest. Special status, or focal, wildlife species for the South Shore Project area include those listed as threatened (T), endangered (E), candidate (C), or de-listed (D) by the U.S. Fish & Wildlife Service (FWS); Forest Service sensitive (S) species, management indicator species (MIS) in the amended LTBMU Forest Plan (USFS); special interest species (SIS) by the Tahoe Regional Planning Agency (TRPA); and FWS migratory land bird species.
- Focal wildlife species are addressed in the biological evaluation and biological analysis (BE/BA), MIS report, TRPA impact analysis report, and/or migratory land bird report for this project. Limited operating periods (LOPs) will apply, following the recommendations of the project biologist, consistent with SNFPA, LRMP, and TRPA Code of Ordinances direction for wildlife species as presented below.
- Implementation of LOPs for marten and/or fisher dens, great gray owl PACs, and Yosemite toad sites is not expected as they have not been discovered, delineated, or known to occur within the wildlife analysis area. The bald eagle and golden eagle nest sites known within the wildlife analysis area are located farther from project activities (approximately 1¼ miles and ½ mile, respectively) than TRPA's recommended resource protection measure distances (½ and ¼ mile, respectively). LOPs will be evaluated annually and recommendations made based on current information. Recommendations presented below for LOPs, by treatment unit, are based on information current prior to the 2010 breeding season. LOPs may be modified during an implementation season following direction from the Forest Plan, as amended by the SNFPA (standards and guides 58, 77, 78, and 79), and the TRPA Code of Ordinances (Ch. 78.3). Additionally, LOPs often apply only to a portion of each unit.

III. Focal Wildlife Species - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WL-1	For California spotted owl protected activity centers (PACs), maintain a limited operating period (LOP) prohibiting vegetation treatments, prescribed fire, or road or trail building within approximately ¼ mile of the activity center, if known, or within ¼ mile of the PAC, if unknown, during the breeding season (March 1 to August 15).	Units 2, 3, 7, 9, 11, 12, 14, 41, 47, 49, 59, 62, 81, 83, 86, 96-99, 107-8, 114, 116, 127-29, 131-32, 139, 169-72, 190-97, 200, 213, 307-09, 311, and 345	SNFPA S&G 75
WL-2	For northern goshawk PACs, maintain a LOP prohibiting vegetation treatments, prescribed fire, or road or trail building within approximately ¼ mile of the activity center, if known, or within ¼ mile of the PAC, if unknown, during the breeding season (February 15 to September 15).	Units 2, 3, 7, 9, 11-12, 38, 59, 64, 67-68, 70-71, 74, 79, 80, 87-90, 116, 132, 139, 169-72, 183-87, 190-97, 199-200-201, 209-10, and 216	SNFPA S&G 76
WL-3	For northern goshawk disturbance zones, maintain a LOP restricting management activities, including habitat manipulation for purposes other than habitat improvement, within approximately ½ mile of existing nest trees located outside urban zones from February 15 to September 15.	Units 1-3, 7, 9, 11-12, 15, 59, 62-63, 69, 80-81, 83-91, 116, 129, 132, 139, 162, 169-71, 190-96, 200, 202, 204-205 and 213	TRPA Ordinance 78.3
WL-4	For the bald eagle winter habitat near Taylor and Tallac creeks, maintain a LOP restricting management activities, including habitat manipulation for purposes other than habitat improvement, from October 15 to March 15.	Units 40, 42-43, 46, 54, 120-21	LRMP Fallen Leaf practice 12 and TRPA Ordinance 78.3
WL-5	For suitable habitat surrounding an active willow flycatcher nest, maintain a LOP prohibiting vegetation treatments, prescribed fire, or road or trail building during the breeding season (June 1 to August 31).	Units 34, 40, 43, 97, and 212	SNFPA STD/GD 58

III. Focal Wildlife Species - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WL-6	For osprey disturbance zones, maintain a LOP restricting management activities, including habitat manipulation for purposes other than habitat improvement, within approximately ¼ mile of the nest during the breeding season from March 1 to August 15.	Units 1, 3, 15, 33, 40, 47, 54, 114, 120-21, 134-40, 149, 170, 211, 213, and 219	TRPA Ordinance 78.3
WL-7	For peregrine falcon disturbance zones, maintain a LOP restricting management activities, including habitat manipulation for purposes other than habitat improvement, within approximately ¼ mile of the nest from April 1 to September 30.	Unit 93	TRPA Ordinance 78.3
WL-8	Where available an average of four of the largest diameter snags and four downed logs per acre would be retained. Snags would be at least 15" dbh in clumped and irregular spacing, depending on the average size class in the stand. (This does not supersede the removal of hazard trees.	Project wide except in Wildlife Areas where a specific snag retention is prescribed	SNFPA S&G # 10 and 11

Aquatic Resources

Goals:

- SEZ fuels reduction treatments in identified Lahontan cutthroat trout habitat are designed to avoid negative habitat effects and meet Endangered Species Act (ESA) conservation and recovery goals.
- Maintain riparian associated shrub and herbaceous vegetative cover, floodplain connectivity commensurate with expected channel geometry, and large woody debris to achieve high quality aquatic habitat.
- Maintain or enhance connectivity within and between watersheds to provide physically, chemically, and biologically unobstructed movement of riparian and aquatic dependent species needed for their survival, migration, and reproduction.
- Retain adequate stream shading to ensure that daily mean water temperatures do not increase as a result of SEZ fuel reduction treatments.

IV. Aquatic Resources - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
AR-1	Leave existing downed trees and CWD that are in perennial or intermittent stream channels in place unless removal is needed to maintain channel stability, as determined by a Forest Service watershed specialist or fish biologist.	Project wide	SNFPA S&G 103 LRMP S&G 15
AR-2	To avoid removing or altering bank stabilizing vegetation, trees may be marked for removal (live or dead) within 5 ft of the bank edge of perennial or intermittent streams and lakes, as approved by the fisheries biologist and watershed specialist, only where fuel loads or stand densities exceed desired conditions and where CWD is at or above desired levels or where trees are a hazard to safe operations.	Project wide	SNFPA S&G 103

IV. Aquatic Resources - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
AR-3	<p>Use directional falling to keep felled trees out of intermittent and perennial streams unless the channel reach is identified as deficient in coarse woody debris or such trees are needed for stream shade, in which case a FS fisheries biologist and watershed specialist would select trees greater than or equal to 12 in DBH to be felled directionally into the channel.</p> <p>Current data indicates that stream segments in units listed, lack CWD to varying degrees. A Forest Service fisheries biologist and watershed specialist would evaluate stream segments for CWD desired conditions and select trees greater than 12" dbh to be felled directionally into the channel to improve aquatic species habitat.</p>	Units 22, 24, 25, 51, 52, 56, 59, 63, 84, 85, 87, 88, 89, 95, 96, 97, 100, 127, 129, 132, 133, 145, 310, 311, 312	<p>SNFPA S&G 102</p> <p>SNFPA S&G 103</p> <p>SNFPA S&G 108</p>
AR-4	<p>Maintain shaded bank conditions on trout streams by retaining at least 50% of the stream bank site potential for herbaceous and shrub cover and at least 25% of the site potential for tree cover. Where natural tree cover is less than 20%, 80% of the potential would be retained. Thirty-five to 70% of the stream would be shaded from 11:00 AM to 4:00 PM. The purpose of this standard is to maintain levels of stream shade to ensure that there is no measurable increase in daily mean water temperatures where fuel reduction occurs.</p>	Project wide	<p>LRMP S&G 20</p> <p>SNFPA S&G 96</p>

Soil, Water, & Riparian Resources

Goals:

- Provide the water quality and soil productivity necessary to support ecological functions and beneficial water uses.
- Implement Region 5 Best Management Practices and project-specific resource protection measures to meet California State water quality standards.
- Meet the riparian conservation objectives of the forest plan, as amended by the SNFPA (2004).
- Maintain connections between floodplains, channels, and water tables to distribute flood flows and sustain diverse habitats.
- Avoid disturbance in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) in order to perpetuate their unique functions, biotic communities, and biological diversity.
- Maintain soils with favorable infiltration characteristics and diverse vegetative cover to absorb and filter precipitation and sustain favorable conditions for stream flows.

Background Rationale for Resource Protection Measures

In order to minimize impacts to water resources from the proposed activities, standard BMPs would be implemented (USDA FS 2000). BMPs are standard management practices that have been developed to protect soil and water, as described in the Region 5 USFS Best Management Practices Handbook. These practices and procedures provide the structure for water quality management for the Pacific Southwest Region (Region 5). The BMPs comply with Section 208 and 319 of the Clean Water Act, and the guidelines of the Water Quality Control Board Basin Plans. Implementation of these State certified and EPA approved BMPs meet the Forest Service obligations for compliance with water quality standards and fulfill Forest Service obligations as a designated Water Quality Management Agency. The basic premise and emphasis for BMPs and the project-specific resource protection measures to implement them are to prevent sources of erosion and dissipate or infiltrate runoff generated by the project before reaching waterbodies. (See Appendix B for a listing of BMPs.) The purpose of the resource protection measures and BMPs is to prevent the source of erosion, rather than to treat erosion after it has occurred. The resource protection measures and BMPs included in the South Shore project design are effective at avoiding or reducing sediment delivery, including the fine sediment fraction (i.e., <16 µm).

The project specific resource protection measures have been developed to minimize or avoid both direct and indirect negative effects of treatments on forest resources and to meet the Riparian Conservation Objectives of the LTBMU Forest Plan (1988), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA, 2004). The riparian conservation objectives (RCOs) in the SNFPA (2004) are incorporated in the design for the project as described in the RCO Analysis Report (Project Record #J14). These objectives address provision of beneficial uses for water resources, geomorphic and biological characteristics of aquatic features, suitable stream habitat features (including CWD), and physical and biological characteristics of riparian areas.

An SEZ sensitivity rating system was developed based on the results of the Heavenly Valley Creek SEZ demonstration project to evaluate mechanical treatments for South Shore SEZ units. The USFS LTBMU SEZ sensitivity rating system was reviewed and approved by the TRPA and Lahontan Water Board (May 30, 2008). This SEZ sensitivity rating system was used over two consecutive field seasons for designation of types of treatment on SEZ units in the project (Appendix C).

Soil type and slope data were analyzed to determine areas that are suitable for mechanical treatments. Vegetation treatments are designed to minimize adverse effects to soils, and maintain productivity. BMPs and resource protection measures specific to prescribed burning would be used to prevent negative effects to soils from prescribed fire duration or intensity.

Normal operating period is generally considered to be from May 1 through October 15 each year. However, operable conditions may be present outside of that time period and inoperable conditions may be present within that period. Resource protection measures may apply to one or more of the following conditions: dry soils, wet soils, frozen or snow-covered soils. (Note: the normal operating period headings may include resource protection measures that apply in wet conditions).

V. Soil, Water, Riparian - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-1	Spill prevention and cleanup of hazardous materials would be implemented in accordance with FS timber sale type B contract clauses and in accordance with the LTBMU Hazardous Spill Notification and Response Plan.	Project Wide	BMP 2-12
WS-2	Watershed or transportation specialist will review project BMPs prior to a large storm event (1 inch or greater) that may exceed BMP capacity and will notify contract administrator if additional BMPs are recommended to disconnect runoff from surface water features (see implementation monitoring, chapter 4).	Project Wide	LTBMU Practice
WS-3	To minimize compaction, gulying, and rutting, ground based operations would be conducted only when soils are dry to moist at the 4-8 inch depth. This determination would be made by a LTBMU watershed specialist or contract administrator, using Appendix D as a guideline.	Project Wide	BMP 1-5 BMP 1-13
WS-4	Design underburning prescriptions to avoid adverse effects on soil and water resources by planning prescribed fire to ensure that fire intensity and duration do not result in severely burned soils.	Project Wide	LRMP S&G 53 and 54

V. 1) Soil, Water, Riparian – Vegetation treatments in uplands (during normal operating period and dry conditions)			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-5	Install water bars on skid trails to provide proper drainage and prevent erosion when operations are complete and prior to a large storm event (1 inch or greater). Design and minimum spacing of water bars would be in accordance with the Forest Service Timber Sale Administration Handbook. Water bars may be required on forwarder trails if surface cover is not adequate to control erosion.	Project Wide	BMP 1-17 FSH 2409.15
WS-6	To the extent practicable, where end-lining occurs on slopes above 10%, end-line material along slope contours (i.e. cross-slope) to avoid creating ruts in the soil that are oriented downhill. Where Forest Service implementation monitoring finds potential for sediment delivery, contractor would rake in the berms from ruts created by end-lining.	Project Wide	LTBMU Practice

V. 2) Soil, Water, Riparian – Vegetation treatments in SEZs (during and outside of normal operating periods).			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-7	Ensure that all exclusion buffers are flagged during all project activities.	Project Wide	LTBMU Practice
WS-8	Flag and avoid equipment use in and adjacent to special aquatic features (springs, seeps, fens, and marshes); use hand treatments in these areas. Refer to the Sensitive Plants resource protections measures for prescribed buffers specific to sensitive plant species.	Project Wide	BMP 1-22
WS-9	Flame heights for underburning would not exceed two feet within 50 feet of stream courses or on wetlands unless higher intensities are required to achieve specific objectives. No ignition is allowed in SEZs. Fire would be allowed to back into these areas.	Project Wide	LRMP S&G 53 and 54 BMP 6-2 and 6-3 SNFPA Std 111
WS-10	Where it is necessary to cross an SEZ area with inoperable soil moisture conditions, equipment would operate over a slash mat, landing mat, or other protective material to minimize soil compaction. If slash is used, it would be removed when operations in the area are concluded. The Contract Administrator will determine the crossing location and method.	Project Wide	BMP 1-5 BMP 1-13
WS-11	Prohibit equipment operations in ephemeral channels. Ephemeral crossings would be avoided where feasible, and where necessary, would be limited to 1 crossing every 800 feet of channel, as determined by the Contract Administrator.	Project Wide	BMP 1-19

V. 3) Soil, Water, Riparian – In Cut to Length Units			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-12	<p>Limit mechanical equipment operations in SEZs to CTL operations or operations using equipment that has been demonstrated to adequately protect soil and water resources (i.e. equipment that is lighter on the land, rubber-tired equipment, equipment that operates on a bed of slash, or other innovative technologies that reduce impacts to soils).</p> <p>Use the SEZ Risk Rating (Appendix C) to determine operability of part or all of the SEZ.</p>	CTL units	<p>BMP 1-13, 5-3, 1-18</p> <p>SNFPA Std 92 and 113</p>
WS-13	<p>Within 25 feet of perennial or intermittent streams and other water bodies (i.e. lakes and ponds) CTL tree removal methods would be limited to reaching in and removing logs where ground contact can be avoided to mitigate ground disturbance.</p> <p>Contract administrator would consult with LTBMU watershed specialist to determine additional needed buffer widths, based on proximity to Lake Tahoe and perennial channels, slope steepness (greater than 20 percent), and amount of existing ground cover (less than 30 percent).</p>	CTL units	BMP 1-19

V. 4) Soil, Water, Riparian – In Whole Tree Units															
Ref #	Resource Protection Measure	Location	BMP/Source Reference												
WS-14	<p>For WT operations, the following table would be used to determine equipment exclusion buffers for perennial channels, lakes and ponds:</p> <table><tr><td></td><td colspan="2">Soil Cover</td></tr><tr><td>Slope</td><td>< 75%</td><td>> 75%</td></tr><tr><td>< 20%</td><td>75 ft</td><td>50 ft</td></tr><tr><td>> 20%</td><td>100 ft</td><td>75 ft</td></tr></table> <p>A minimum 25 ft buffer would still apply in WT treatments units for intermittent channels.</p> <p>A minimum 10 ft buffer from the top of steep slopes (>30%) that are connected to an SEZ would also apply for whole-tree equipment exclusion.</p> <p>Contract administrator would consult with LTBMU watershed specialist to determine additional needed buffer widths, based on proximity to Lake Tahoe and perennial channels, slope steepness (greater than 20 percent), and amount of existing ground cover (less than 30 percent).</p>		Soil Cover		Slope	< 75%	> 75%	< 20%	75 ft	50 ft	> 20%	100 ft	75 ft	WT units	BMP 1-19
	Soil Cover														
Slope	< 75%	> 75%													
< 20%	75 ft	50 ft													
> 20%	100 ft	75 ft													
WS-15	Ground based equipment would not operate within the equipment exclusion buffer for WT, (see WS-14) except at temporary or permanent stream crossings, but may reach in to remove material.	WT units	BMP 1-19												
WS-16	<p>Ground based equipment in WT treatment stands would not operate in SEZs. To achieve desired fuel loading in SEZs within WT units, trees may be end-lined out of the SEZ after consultation with a Watershed Specialist.</p> <p>a) Provide ground cover adequate to prevent erosion in disturbed areas, such as slash, wood chip, or masticated material.</p> <p>b) Where implementation monitoring finds potential for sediment delivery, contractor would rake in the berms from ruts created by end-lining.</p>	WT units	BMP 1-19 BMP 1-22 BMP 5-3 BMP 1-18 LRMP S&G 43												

V. 5) Soil, Water, Riparian – Hand piling and Pile burning in SEZs			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-17	Avoid piling slash within 50 ft of perennial or intermittent streams, lakes, bogs, and fens. Slash would not be piled in springs and seeps.	Project Wide	BMP 6-3LRMP S&G 53
WS-18	Permit piling and burning up to 10 feet from the edge of ephemeral channels.	Project Wide	BMP 6-3
WS-19	Allow fire to creep between piles and into these buffers, maintaining a burn intensity that would protect soil and water resources. Do not allow fire in flagged areas with sensitive plant occurrences or noxious weeds.	Project Wide	BMP 6-3 SNFPA S&G 111
WS-20	No more than 15 percent of any SEZ acre may be piled for burning in a given year (based on an average pile diameter and an average pile spacing of 10 feet).	Project Wide	LTBMU Practice SNFPA S&G 111
WS-21	After initial ignition of piles, but while still burning, allow each pile to be re-piled once (i.e., place unburned pieces back into the burning pile). Additional re-piling will be allowed if necessary to achieve 80 percent consumption of the piled material, except for piles adjacent to aspen.	Project Wide	LTBMU Practice SNFPA S&G 111
WS-22	Hot piling of burn piles is prohibited within SEZs (i.e. don't feed one pile with the material from other piles or ground material).	Project Wide	LTBMU Practice SNFPA S&G 111

V. 6) Soil, Water, Riparian – Landings			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-23	All reasonable efforts would be made to use existing landings where available. Where no existing landings are available new landings would be constructed. New landings would be no larger than required in order to safely facilitate the handling and removal of biomass material in compliance with OSHA requirements. Landings would average less than one acre in size and the maximum size would be two acres.	Project Wide	BMP 1-12 LTBMU Practice
WS-24	Prohibit landings, fuel storage, and refueling in SEZs.	Project Wide	BMP 1-12 BMP 2-12
WS-25	Locate landings and refueling areas outside RCAs where operationally feasible. Prohibit fuel storage in RCAs. Procedures and spill prevention control measures for hazardous materials of any amount are included in project contract clauses.	Project Wide	BMP 2-12 BMP 7-4 SNFPA S&G 99 LTBMU Haz. Spill Notification & Response Plan
WS-26	Proper drainage from landings will be provided during use; ditching, sloping, and water bars or other BMPs may be used where needed as recommended by watershed specialist to disconnect runoff from surface water features.	Project Wide	BMP 1-16 LRMP S&G 10

V. 6) Soil, Water, Riparian – Landings			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-27	<p>Restore landings after operations are complete using the following methods, as determined by the LTBMU Watershed Specialist:</p> <ul style="list-style-type: none"> a) Providing ground cover, such as slash, wood chips or masticated material (spread no more than 6-inches thick). b) Ditching, sloping, and water bars may be used where needed as recommended by watershed specialist to disconnect runoff from surface water features. c) Landings will be ripped to approximately a 12-inch depth after ground cover has been spread. Ripping is not permitted in known infestations of noxious weeds, and may not be possible in rocky soils; this determination may be made by the Contract Administrator. d) Landings within 50 feet of an SEZ or greater than ¼ acre will be seeded with a native seed mix of grasses, forbs, and shrubs. Landings within 100 feet of noxious weed infestations may require seeding depending on weed species; consult with LTBMU botanist to determine if seeding is necessary. 	Project wide	<p>BMP 1-15</p> <p>BMP 1-16</p> <p>LRMP S&G 10 and 43</p>

V. 7) Soil, Water, Riparian – Vegetation Treatments in Uplands (outside of normal operating period or wet conditions)			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-28	<p>When working outside of the normal operating period, conditions must be adequate to prevent erosion, sediment delivery to water bodies, and soil compaction that would impact soil productivity or soil hydrologic function. Equipment operations would take place on portions of the treatment unit where adequate snow or frozen ground conditions are present while considering the above desired outcome. The following criteria will be applied in determining equipment operations:</p> <ul style="list-style-type: none"> a. Frozen soil operations are permitted where operated vehicles, tractors and equipment can travel without sinking into soil and landing surfaces to a depth of more than 2 inches for a distance of more than 25 feet. Temperatures must also remain low enough to preclude thawing of the soil surface. b. For over-snow operations, maintain approximately 12 inches of compacted snow/ice on undisturbed ground, and 6 inches of compacted snow/ice on existing disturbed surfaces c. Lesser depths may be agreed to by a LTBMU Watershed Specialist and the Contract Administrator based on new and relevant research and monitoring. 	Project wide	BMP 1-13 BMP 5-6
WS-29	If operable soil moisture conditions are present beneath a lesser snow depth (i.e., less than 6 inches), operations may continue until soil moisture conditions become inoperable (see Appendix D).	Project wide	BMP 5-6
WS-30	Flag and avoid springs, seeps, and other areas that do not freeze well.	Project wide	SNFPA S&G 118
WS-31	When working outside of the normal operating period, monitor operations daily when rain is probable. When temperatures rise, ensure that adequate snow and frozen soil depths are maintained during over snow/frozen operations.	Project wide	BMP 5-6
WS-32	Move equipment and materials to areas near pavement before conditions become inoperable.	Project wide	BMP 5-6

V. 7) Soil, Water, Riparian – Vegetation Treatments in Uplands (outside of normal operating period or wet conditions)			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
WS-33	For over-the-snow and frozen soil operations in SEZs, use a 25 foot mechanical exclusion buffer on perennial and intermittent channels.	Project wide	BMP 1-19
WS-34	When adequate snow or frozen soil conditions are not present, temporary crossings on intermittent or ephemeral channels may be approved on a case by case basis through agreement between the contract administrator and a watershed specialist. Crossing density would be limited to 1 crossing every 800 linear feet of stream channel. Construct and maintain these crossings to prevent bank damage, water quality impairment, and obstructed flows.	Project wide	BMP 1-19

Transportation and Access (Roads)

Goal:

- Design the transportation system to Forest Service standards to support fuels reduction activities and equipment.

VI. Roads - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
R-1	Implement road BMPs during active periods of road use and at the conclusion of project activities	Project wide	BMP handbook LTBMU Practice
R-2	All native surface Forest Service roads that intersect with Forest Service paved or chip sealed roads would be stabilized through the use of aggregate base material (standard specification C or D) or wood chips to minimize tracking soils onto the pavement. Soil type, grade, and alignment will determine the extent of this stabilization.	Project wide	BMP 2-22 FP03
R-3	System roads would be reconstructed and/or maintained to Forest Service standards (including BMPs) that support equipment and trucks needed for project activities. These standards and BMPs are tailored to protect soil and water quality resources from impacts of the specific equipment classifications to be used for the project activities and disconnect road runoff from surface water features.	Project wide	BMP 2-22 FSH 7709.58
R-4	Roads would be watered for dust abatement at least as often as specified in FSH 2409.15. Water used for dust abatement would come from South Tahoe Public Utility District hydrants. Commercial dust palliatives may be used, if approved by the contract administrator.	Project wide	BMP 2-23 FSH 2409.15
R-5	Concrete mixing would only occur within an impenetrable, self-contained and removable container that provides protection from accidental runoff. Concrete mixers or sweepings would not be washed out within 50 feet of storm drains, open ditches, streets, SEZs, or waterbodies. Concrete washings and wastes would be stored in an impenetrable container for later disposal, and disposed of properly. Uncured concrete materials would be stored in a weatherproof area, away from SEZs and waterbodies.	Project Wide	BMP 2-2 FP03

VI. 1) Temporary Roads			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
R-6	New temporary roads would be out-sloped to ensure that effective drainage is maintained. BMPs would be installed as recommended by watershed or transportation specialist to ensure that temporary roads are hydrologically disconnected from intermittent and perennial stream channels. These BMPs could include lead-off ditches, water bars, rolling dips, etc. and would be installed during temporary road construction and maintained during the time the road is in use or at the end of operations each day if rain is predicted.	Project wide	BMP 2-1 BMP 2-4 BMP 2-5 LTBMU Practice
R-7	Encroachment permits would be needed to access City of South Lake Tahoe streets and/or Eldorado County roads from Forest lands. Stabilization of these easements may be required to minimize the tracking of debris and soils onto City streets. Streets would be cleaned of tracked dirt and debris as needed. On site meetings with city engineers would determine the extent and type of stabilization to utilize at each intersection. These intersections would be temporary, and be blocked or obliterated when the project is complete.	Project wide	LTBMU Practice BMP 2-22 CASQA
R-8	Temporary crossings on ephemeral drainages would be constructed and removed when the channels are dry (BMP#2-16). If channel is not dry at time needed for removal (eg end season winterization), implement dewatering BMPs prior to crossing removal.	Project wide	BMP 1-19 BMP 2-16
R-9	Temporary crossings on intermittent drainages would be constructed and removed when the channels are not flowing (BMP#2-16) and installed such that water flow and fish passage are not obstructed. If channel is not dry at time needed for removal (eg end season winterization), implement dewatering BMPs prior to crossing removal.	Project wide	BMP 1-19 BMP 2-16
R-10	Temporary crossings on intermittent drainages would be designed to accommodate a 1" or greater precipitation event and all Humboldt crossings would be removed before the winter season begins.	Project wide	BMP 1-19 BMP2-16

VI. 2) Roads (outside of normal operating period or wet conditions)			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
R-11	Unless adequate snow cover or frozen soil conditions exist, where a native surface road meets a paved road, the road intersection would be covered with rock or organic material to minimize tracking of soil onto the paved road.	Project wide	BMP 2-22 CASQA Equivalent to R-2, shown here to account for where stabilizing material does not exist under snow
R-12	If a native surface road becomes rutted, the road would be closed. If it is determined that stabilization of the road way can be accomplished by spot-rocking (application of an even grade sub-base material, FS Specification A, B, or equivalent) or other mitigation of rutted areas, road use may continue. Rutting is defined as greater than two-inch deep depressions more than 25 ft. in length.	Project wide	BMP 2-24 FP03
R-13	During winter operations, paved surfaced roads may be plowed, including turnouts, if the action will not cause damage to the road surface and associated drainage structures.	Project wide	BMP 2-25
R-14	On native surface roads, retain a minimum of 6 inches of compacted snow on 85% or more of the road surface after plowing to facilitate freezing. During road use, a minimum of 6 inches of compacted snow must be present on 85% or more of the road surface, unless the road surface is frozen adequately to prevent rutting (as defined above). Ensure that plowing does not damage drainage structures or road surface.	Project wide	BMP 2-2 BMP 2-25
R-15	Road alignments within the contract area that require snow removal would be visibly marked on both sides along the entire alignment to facilitate plowing. Excess snow removed during plowing would not be placed into drainages or riparian areas.	Project wide	BMP 2-2 BMP 2-25
R-16	Before over-the-snow operations begin, mark existing culvert locations. During and after operations, ensure that all culverts and ditches are open and functional.	Project wide	BMP 2-25

VI. 2) Roads (outside of normal operating period or wet conditions)			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
R-17	When roads are plowed, snow berms must be breached to allow drainage during snowmelt. Space outlets so as not to concentrate road surface flows (usually spaced at a minimum of every 300 feet).	Project wide	BMP 2-25
VI. 3) Road Decommissioning			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
R-18	At the conclusion of use, the road would be returned to the use designated in the applicable RMO. Designated Forest Service trails would be returned to their previous width.	Project wide	BMP 2-26
R-19	<p>After mechanical operations are complete, and where feasible based on soil type, temporary roads would be restored by using the following methods.</p> <ul style="list-style-type: none"> • Providing ground cover such as slash, wood chips, or masticated material (spread no more than 6 inches thick). • Removing all temporary crossings and installing drainage structures (such as water bars, dips, and leadoff ditches) as appropriate to prevent water accumulation on the decommissioned road surfaces as per FSH 2409.15. • Installing natural barriers such as large logs and rocks where necessary at road entrance points to prevent continued use of decommissioned road alignments. • For new temporary roads only: ripping where the rock content of the soil allows (generally <30-40% cobbles by volume), where noxious weeds are absent, and when soils are moist or dry. The Contract Administrator would determine whether ripping is feasible. 	Project wide	FSH 2409.15 BMP 1-17 BMP 2-26
R-20	Barriers would be strategically established along open areas adjacent to roads or trails (boulders, split rail fence, and barriers/signs) to discourage post-treatment establishment of user-created routes	Project wide	BMP 4-7

Sensitive Plants

Goal:

- Minimize negative impacts to sensitive plants.

VII. Sensitive Plants - General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
SP-1	Prior to project activities, flag all identified sensitive plant populations, sensitive plant communities and special interest Sphagnum areas with a protection buffer that extends 100 feet from the edge of the population. An LTBMU Botanist will help identify specific plant areas (on-site) during project implementation in Units 266 & 269. Identified populations:		R5 Sensitive Plant list LRMP LTBMU Practice SNFPA S&G 118
	<i>Botrychium ascendens</i> (upswept moonwort)	Unit 241	Above applies to all
	<i>Botrychium minganense</i> (Mingan moonwort)	40' from Unit 9	
	<i>Epilobium howellii</i> (subalpine fireweed)	25' from Units 82 & 84	
	<i>Meesia triquetra</i> (three-ranked hump-moss) <i>Meesia uliginosa</i> (broad-nerved hump-moss)	Unit 269 (Angora Fen)	
	<i>Meesia triquetra</i> (three-ranked hump-moss) <i>Meesia uliginosa</i> (broad-nerved hump-moss)	Unit 266	
	<i>Meesia triquetra</i> (three-ranked hump-moss)	Unit 84 (Fountain Place Fen)	
	<i>Sphagnum</i> sp. (sphagnum moss)	Units 186 & 187 (Osgood Swamp)	
	Sphagnum Fen #1	Unit 184	
	<i>Sphagnum</i> sp. (sphagnum moss)	Unit 187 (Sphagnum Fen #2)	

VII. Sensitive Plants - General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
SP-1 Cont.	<i>Sphagnum sp.</i> (sphagnum moss)	Unit 183 & 184	
	<i>Rorippa subumbellata</i> (Tahoe yellow cress)	Unit 40	
	<i>Meesia triquetra</i> (three-ranked hump-moss) <i>Sphagnum sp.</i> (sphagnum moss)	Unit 22	
SP-2	No project activities would be allowed within flagged protection buffer, unless approved by forest botanist. These activities include hand or mechanical treatment, endlining and prescribed fire. Where safely feasible trees would be directionally felled away from buffered areas	Project wide	LTBMU Practice
SP-3	If any additional sensitive plants or sensitive plant communities are found during or prior to implementation they would be flagged, buffered, and avoided.	Project wide	LTBMU Practice

Sensitive Fungi

Goal:

- Minimize negative impacts to sensitive fungi from project activities.

VIII. Sensitive Fungi - General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
SF-1	LTBMU Botanists would be notified prior to any project implementation to flag monitoring plot.	Unit 83	LRMP LTBMU Practice

Noxious Weeds

Goal:

- Reduce the likelihood of introduction or spread of noxious weeds within the treatment areas.

IX. Noxious Weeds - General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
WE-1	Weed infestations identified within the project area (including travel routes and staging or landing areas) would be treated by approved methods or flagged and avoided and accepted for use by the Noxious Weed Coordinator before project implementation.	Project wide	SNFPA S&G 40 RNWMS Noxious Weed EA
WE-2	All off-road equipment used on this project would be washed before moving into the project area to ensure that the equipment is free of soil, seeds, vegetative material, or other debris that could contain or hold seeds of noxious weeds. "Off-road equipment" includes all logging and construction equipment and such brushing equipment as brush hogs, masticators, and chippers; it does not include log trucks, chip vans, service vehicles, water trucks, pickup trucks, and similar vehicles not intended for off-road use. When working in known weed infested areas equipment would be cleaned before moving to other National Forest System lands which do not contain noxious weeds. LTBMU Contract Administrator would document required equipment washing.	Project wide	SNFPA S&G 39 and 40 RNWMS

IX. Noxious Weeds - General			
Ref#	Resource Protection Measure	Location	BMP/Source Reference
WE-3	All gravel, fill, or other materials are required to be weed-free. LTBMU Contract Administrator would inspect equipment and document certifications for weed-free materials. Use onsite sand, gravel, rock, or organic matter when possible.	Project wide	SNFPA S&G 40 RNWMS
WE-4	Use certified weed-free mulches and native seed sources for revegetation, including roads and landings. Seed mixes must be approved by a Forest Service botanist.	Project wide	SNFPA S&G 42
WE-5	Prohibit pile burning or underburning in infestations of species known to increase with fire.	Project wide	SNFPA S&G 40 RNWMS
WE-6	Minimize the amount of ground and vegetation disturbance in construction areas. Reestablish native vegetation where feasible on disturbed bare ground to minimize weed establishment and infestation. Revegetation is especially important in staging and landing areas.	Project wide	SNFPA S&G 40 RNWMS

Recreation

Goals:

- Ensure public safety during project activities.
- Schedule project activities to minimize disruption to peak season use at developed recreation sites, such as campgrounds, recreations residences, and resorts when practical.

X. Recreation - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
Rec-1	Minimize the extent and duration of temporary forest closures associated with mechanical treatments. Provide signage during closures informing the public of the reasons for the closure and alternative options for recreation access during the closure.	Project wide	LTBMU Practice
Rec-2	Schedule mechanical treatments where practical to avoid peak visitor use recreation times (July 1 – Labor Day) in and adjacent to the following developed recreation areas: Camp Richardson Resort, Camp Richardson Corral, Fallen Leaf Campground, Baldwin Beach, Tallac Historic Estates, and recreation residence tracts.	Project wide	LTBMU Practice
Rec-3	Provide information to the public through LTBMU visitor services regarding current and planned temporary forest closures associated with treatment units.	Project wide	LTBMU Practice

Scenic Resources

Goal:

- Develop treatment prescriptions consistent with the adopted visual quality objectives identified in the LTBMU Forest Plan.

XI. Scenic Resources - General			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
SR-1	Retain up to 15% of existing 4 to 10-inch dbh trees and shrubs within foreground views (generally 100 feet) from the following travel routes: Pioneer Trail, Hwy 50, Hwy 89. Create irregular spacing and clumping distribution between trees and groups of trees within foreground views where practical.	Project Wide	LTBMU Practice LRMP S&G 3
SR-2	Design prescribed fires to retain up to 15% of selected understory vegetation, as well as to reduce evidence of tree scorching within foreground views (generally 100 feet) from Pioneer Trail, Hwy 50, and Hwy 89.	Project wide	LTBMU Practice LRMP S&G 3
SR-3	Minimize cut stump heights. Stump heights will not exceed approximately six inches measured from the uphill side.	Project wide	LTBMU Practice LRMP S&G 3
SR-4	Locate mechanical treatment landings beyond foreground views (generally 100 feet) from travel routes Pioneer Trail, Hwy 50, and Hwy 89 where feasible.	Project wide	LTBMU Practice LRMP S&G 3

Heritage Resources

Goal:

- Protect cultural resources during treatment activities.

XII. Heritage			
Ref #	Resource Protection Measure	Location	BMP/Source Reference
HR-1	Identified cultural sites would be flagged and mechanical equipment would be prohibited	Project wide	Programmatic Agreement
HR-2	Use hand treatments to reduce wildfire effects within heritage sites.	Project wide	Programmatic Agreement
HR-3	Evaluate linear features to establish possible crossing areas.	Project wide	Programmatic Agreement
HR-4	Protect arborglyphs during prescribed fire	Project wide	Programmatic Agreement

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below each topic heading.

Utilizing Hand Thinning as the only treatment method within SEZ

An alternative was considered where no mechanical equipment would be used in stream environment zones (SEZs). Treatment would consist of hand thinning and piling only. This alternative was dropped from further consideration because of forest health objectives, feasibility, safety and treatment needs for riparian vegetation:

- If mechanically treated stands with SEZs were to be hand thinned, a majority may not be thinned to the desired condition for forest health objectives due to the amount of trees greater than 14" dbh that could not be safely hand carried from within the SEZ no pile zone.
- If mechanically treated stands with SEZs were to be hand thinned, the length of time that the thinning treatment would be effective would be shortened. Stands would grow back to levels that exceed the desired stand density objective within 5 to 10 years as opposed to remaining at desired densities for 20 years or longer.
- If mechanically treated stands with SEZs were to be hand thinned, there is the potential that high levels of fuel loading within the no-pile buffer of the SEZ, would remain. With hand thinning, fuels would need to be moved out of this zone for piling manually. It would be difficult, costly, and unsafe to move all bole material greater than 14" diameter outside of the no-pile buffer. Fuels greater than 14" diameter may have to be left within the SEZ no-pile buffer which would likely exceed the desired maximum fuel load of 15 tons per acre.
- There is no environmental benefit to conducting hand thin operations within an SEZ as opposed to Cut-to-length/log forwarding harvest systems. Cut-to-length/log forwarding systems have been proven to be able to operate within SEZ areas with soil types similar to those within the Heavenly SEZ Demonstration Project with no adverse environmental affects.
- In order to meet the purpose to promote dominance of riparian vegetation, there is a need to remove conifer invasion in aspen stands that are within SEZs, and some trees larger than 20" dbh need to be removed. Prohibition of mechanical equipment in SEZs would prevent achievement of healthy riparian vegetative conditions where aspen, willow, and other riparian vegetation dominate in SEZs.

Treatment using Cut-To-Length equipment only

An alternative was considered to use only CTL equipment for thinning trees in the mechanical treatment areas of the project. Whole tree thinning methods would not be used. This alternative was dropped from further consideration because:

- Limiting mechanical equipment to CTL methods outside of SEZs would lengthen the implementation time to such an extent that the project would not provide the fuel reduction

needed for communities in a timely manner. CTL operations in the central Sierra Nevada are limited. About 500 acres per year has been the maximum production level for CTL tree thinning in the Lake Tahoe Basin. The average production has been 350 acres per year, which would extend implementation of the South Shore project over a period ranging from 12 to 17 years. This extended time of implementation would fail to reduce hazardous fuel levels for communities and homes adjacent to the National Forest in a timely manner.

- Due to the limitations of CTL systems, whole tree or conventional equipment is more efficient at removing biomass. This is because whole tree logging does not leave as much fuel on the ground as CTL because trees are processed at the landing instead of in the stand. Based on analysis presented in the document, WT methods have acceptable impacts to resources.

No removal of fuels in Wildlife Areas

An alternative was considered with no fuel reduction activities within spotted owl or goshawk PACs or TRPA goshawk disturbance zones, osprey, or bald eagle habitats (referred collectively in this EIS as Wildlife Areas). This alternative was dropped from further consideration because:

- The Wildlife Areas are distributed throughout the project area and account for almost 3,700 acres or 30% of the project area. To not implement treatments to reduce fuels on this much of the project area would leave substantial amounts of hazardous fuels in areas identified as needing fuel reduction. While treating the individual remaining stands would result approximately 2/3 of the project area meeting the desired condition, leaving approximately 1/3 of the area untreated would fail to meet the desired conditions over the landscape. The amount and distribution of untreated fuels in the Wildlife Areas would not reduce the potential for crown fires to an acceptable level. This would leave homes and the community vulnerable to wildfire. The purpose and need of the project would not be met.

Concentration of operations in only one area at a time

An alternative was considered that would schedule nearby mechanical treatment at the same time to improve operational efficiency with less movement of equipment among fuel reduction areas. This alternative was dropped from further consideration because:

- While this alternative is the least costly from an economical operations standpoint, it has higher negative impacts to watersheds. This alternative would cause more of the HUC7 watersheds within the project analysis area to exceed 100% of their threshold of concern. This alternative could cause unnecessary risk for environmental harm and may not meet water quality standards.
- This alternative would also not meet the need to provide alternate refuge habitat for sensitive species when fuel reduction activities were scheduled in their habitat areas, which would increase the potential for negative impacts to sensitive species.
- This alternative would also have greater short-term impacts to scenic quality by concentrating activities within view areas.

Establish a limit to the size of trees cut

Public comments received during scoping indicated a concern for removal of trees that exceeded various diameter limits; 12", 14", 16", 20", 24", and 30" dbh. It was stated in the comments that no trees greater than 12" dbh need to be removed in order to meet fuel reduction objectives. One comment was that

thinning needs be analyzed by two-inch diameter increments on a stand-by-stand basis to determine the diameter classes needing removal to achieve fuels objectives. An alternative was analyzed to respond to these comments and limit tree removal to 12" dbh or less. This alternative was dropped from further consideration for several reasons:

- The current stocking levels within the South Shore project are highly variable. While there are some stands in the South Shore project where the desired stocking level of 80 to 150 sq ft basal area per acre might be reached by only removing trees up to 12" (or incrementally larger diameter limits (e.g. 16")) there are many stands where a diameter limit would leave too many trees and the stand would be over stocked, unhealthy and vulnerable to wildfire. Removal of the smaller diameter trees first, proceeding by size classes to increasing diameters to meet the purpose and need to reduce fuels and stand density is known as understory thinning, and is basic to the design of the South Shore project. The selection of trees to be thinned in the South Shore project action alternatives would begin with the smallest trees (suppressed and intermediate trees) and continue to remove trees of increasing diameter until the desired stocking level is reached. In some situations larger trees up to 30" in diameter would need to be removed to meet this target stocking level. This stocking level represents the density at which any higher stand densities would increase competition and probability of tree mortality from lack of resources, disease and/or insect attack increases. In most units within the South Shore project few trees near 30" diameter would need removal to meet the desired stocking level. Using an absolute diameter limit in all stands as the decision criteria for removal of trees would not meet the long-term purpose of improving forest health in addition to hazardous fuels reduction. The use of basal area as the target is a much better measure of a healthy stand than using diameter limits. The need to reduce basal area and increase spacing between trees to reduce competition for light, water, and soil nutrients in order to reduce mortality and increase resistance to drought, insects, and disease would not be met. Overly dense forest stands often suffer stress from drought and competition for nutrients, which subjects them to widespread forest dieback from insects and diseases.
- The use of diameter limits if imposed on roads and landings could prevent use of some existing openings as landings where the use of the area is in all other respects acceptable but for a few trees that would exceed the diameter limit. This could lead to additional disturbance to create new landings where diameter limits would allow or prevent the ability to create landings where needed which would result in treatment units (or portions of them) not being treated.
- Imposing a set diameter limit would prevent effective removal of encroaching conifers in SEZs and aspen stands, some conifers with diameters exceeding 12" need to be removed to release aspen stands and retard future conifer encroachment. Along some SEZs, some conifers over 12" dbh need to be removed in order to allow riparian vegetation to become dominant.
- One of the identified purposes is to reverse this historically created species distribution through retention of Jeffrey and sugar pine and removal of white fir. In order to meet this need, various diameters of white fir need to be removed, including trees over 12" dbh. The mix of conifer species present in the South Shore area now are not at desired conditions nor do they represent the historic diversity present before the Comstock logging era. Logging during the Comstock era selectively removed Jeffrey and sugar pine from the Lake Tahoe Basin and left a preponderance of less fire-resistant and less drought-tolerant white fir and lodgepole pine. One of the stated purposes of the South Shore project is to attain desired conditions of larger, widely spaced, more fire-resistant trees. See the Chapter 1 sections: Emphasis on Reducing Conifer Density and Treating Fuels; and Purpose and Need for Action.

Thinning trees and brush only in the Defensible Space zone within 200 feet of homes

An alternative was considered that would only thin trees and brush in the defensible space zone, offering this service to homeowners who wish to participate (thinning would occur on private land (for willing homeowners) and on public lands within 200 feet of homes). This alternative was dropped from further consideration for several reasons:

- Limiting fuels reduction and forest health treatments to within 200 feet of a home would reduce proposed treatments to less than 900 acres over the entire project area. This would result in almost 9,770 acres or 92% of the project area not being treated. To not implement treatments that reduce fuels on this much of the project area would leave substantial amounts of hazardous fuels in areas identified within the WUI as needing fuel reduction. In addition, the treatments implemented under this alternative would fail to meet the desired conditions over the landscape and have little to no effect on changing fire behavior across the landscape. While this alternative could improve defensible space to homes, it would leave homes and the community vulnerable to large wildfire events. The purpose and need of the project would not be met under this alternative.
- This alternative would not meet the need for restoration of forest health and restoration of SEZs including aspen stands in the South Shore area as described in the FEIS (Chapter 1 Purpose and Need For Action, items #2 and #3).
- Implementing fuels reduction treatments beyond the National Forest boundary on private or other ownerships is outside the scope of authority for the Forest Service and this project.

No treatment in areas greater than 1 ½ miles from residences

An alternative was considered that would eliminate treatments further than 1 ½ miles from year-round residences, i.e., treatments would not occur along Highway 89 or the paved road to Fountain Place. This alternative was dropped from further consideration because:

- Highway 89 was identified as an essential egress route by the Fallen Leaf and Lake Valley Fire Protection Districts, and the South Lake Tahoe Fire Department in their community wildfire protection plans (CWPPs). The HFRA requires that projects accomplished under HFRA authority be consistent with the CWPPs. Elimination of treatments along Highway 89 would fail to modify wildfire behavior along an identified egress route and would not be consistent with the CWPPs.
- The Stewardship Fireshed Assessment (USDA FS LTBMU 2007) showed that the area between private lands in Fountain Place and the City of South Lake Tahoe would exhibit crown fire behavior similar to the recent Angora fire, and, with prevailing southwest winds, untreated lands would present a high risk to homes, neighborhoods, and critical infrastructure (transmission lines) in South Lake Tahoe. Failure to reduce hazardous fuels and modify fire behavior in this area would not meet the purpose to reduce risk to life and property in that area of the Lake Tahoe Basin.
- The project identifies objectives for both fuels reduction and restoring healthy forest conditions. In Chapter 1 it is stated under purpose and need that “there is a need for restoration of forest health in the South Shore area where stands of trees have become overly dense. Existing overcrowded stands have higher than average mortality which leads to ever-increasing fuel loads and high intensity wildfire risk which subjects them to widespread forest dieback from insects and diseases.”
- As described in the proposed action (Chapter 1) the treatment area within the WUI is consistent with the Forest Plan. “Consistent with SNFPA (USDA FS 2004a, p. 40), in the project area, the

WUI boundaries were refined based upon site-specific topography and other features that provide logical fireline placement during suppression, such as slope breaks, roads, and streams.”

Accomplishing fuels treatments and stream restoration activities at the same time

An alternative was considered that would schedule thinning treatments and stream channel restoration activities at the same time so that impacts of project activities occur in one entry. This alternative was dropped from further consideration because:

- This alternative would concentrate the effects of both activities in SEZs into a shorter timeframe, without allowing watershed recovery time between thinning activities and ground disturbance for stream restoration activities. This concentration of activities in a shorter time could increase the negative effects to a greater degree than the additive effects of the separate activities when spaced over time.
- The following restoration projects are currently under various stages of planning and implementation and would not meet the timing schedule for South Shore treatments:
 - Cold Creek/High Meadows – Project has been initiated under a separate NEPA decision completed in 2009.
 - Upper Truckee River – This is a joint project with the CA Tahoe Conservancy due to the presence of both state and federal lands in the project area, and could not be included in this project for that reason.
 - Angora Creek, Seneca Pond, and Gardner Mtn. Meadow – All were included in the NEPA decision for the Angora Fire Restoration Project due to their location within the Angora burn area.
 - Stream restoration activities are outside the HFRA authorization, and are not included in the purpose and need for fuels reduction and thinning to promote healthy forest vegetative conditions.

Basing treatment on modelled condition of individual stands

An alternative was considered that would treat only units where fire behavior modeling for individual stands showed the unit would exhibit crown fire behavior. This alternative was dropped from further consideration because:

- This alternative does not meet the Forest Plan direction as amended by the SNFPA for providing fuel treatments that are effective within the WUI and on a landscape level. The WUI is made up of many different stands of trees, with a wide variety of fuel conditions in close proximity to each other. Wildfire behavior is not only dependent on the individual stand condition; it is also dependent on the conditions within –and adjacent to– stands. While an individual stand could model as a surface fire if it were isolated, when adjacent to other stands that exhibit crown fire behavior, it could support a conditional crown fire.
- Stands where spacing and basal area meet the desired conditions, indicate healthy forest conditions, and that do not have unacceptable levels of hazardous fuels, are not proposed for treatment in the South Shore project.

Implementing Fuels Management direction contained in the 2001 SNFPA

An alternative was considered that would implement direction in the 2001 Sierra Nevada Forest Plan Amendment (SNFPA). This alternative would have a maximum 20" dbh limit for tree removal. The 2001 SNFPA also required retaining 10% to 20% of all stands in an untreated condition during hazardous fuel reduction treatments. This alternative was dropped from further consideration because:

- The LTBMU Forest Plan was amended by the 2004 SNFPA, which superseded the 2001 SNFPA.
- Limiting the diameter of trees cut to 20" dbh would not meet the purpose and need of this project. The rationale is described in detail above ("Limit the size of trees cut").
- Retaining 10% to 20% of all stands in an untreated condition would in most areas not meet the purpose and need of the project at the stand level. The desired condition of the project is defined by the remaining basal area and tons per acre within the treated stands. The existing condition of stands within the South Shore Project area varies widely. Leaving 10% to 20% of the stands untreated would leave the landscape vulnerable to wildfire. In addition, the action alternatives propose to treat only about 15% of the total area within the Analysis Area, therefore much of the area will not be treated. The treatments are planned only for areas within the WUI. The forested lands outside the WUI will remain untreated.

Comparison of Alternatives

Table 2-5. Changes in treatment types for SEZ and upland areas by alternative

Thinning Treatment Type	Alternative 2 Acres	Alternative 3 Acres	Difference Acres
Hand Treatment SEZ	87	138	51
Hand Treatment Uplands	4855	5823	968
Total Hand Treatment	4942	5961	1019
Cut to Length SEZ	447	385	-62
CTL Uplands	1463	1625	162
Total Cut-to-Length	1910	2010	100
Whole Tree with SEZ inclusions	198	170	-28
WT Uplands	3620	1971	-1649
Total Whole Tree	3818	2141	-1677
Total Mechanical Treatment	5728	4151	-1577
Total SEZ treatment	732	693	-39
Total Uplands	9938	9419	-519
Total treatment	10670	10112	-558

Table 2-6. Comparison of fuel treatment type acres by alternative

Fuel Treatment Type	Alternative 2 Acres	Alternative 3 Acres	Differences Acres
Lop & Scatter	2353	1616	-737
Landings – pile burning and/or removal	128	77	-51
Mastication/ Chipping	2480	2617	137
Pile and burn	4372	5217	845
Underburning (Lop & Scatter)	850	774	-76
Pile and burn (SEZs)	87	138	51
Lop & Scatter (SEZs)	198	170	-28
Underburning (SEZs)	32	28	-4

Table 2-7. Comparison of wildlife treatment acres by alternative*

Sensitive Species & Habitat	Alternative 2	Alternative 3	Change
Number of CA spotted owl PACs treated	6	5	-1
Acres of CA spotted owl PACs treated	850	604	-246
Number of CA spotted owl HRCAs treated	7	7	0
Acres of CA spotted owl HRCAs treated	3001	2559	-442
Number of goshawk PACs treated	9	7	-2
Acres of goshawk PACs treated	1320	967	-353
Acres treated within goshawk TRPA Disturbance Zone	2554	2248	-306
Acres treated within bald eagle winter habitat	162	154	-8
Acres treated within osprey TRPA disturbance zone	567	541	-26
* Due to spatial overlap, the change in acres is discrete for each row (not a cumulative total, by alternative).			

Table 2-8. Decrease in proposed road construction and landings between Alternatives 2 and 3

	Alternative 2	Alternative 3	Change (Decrease)
New temporary roads	4.8 mi	3.8 mi	- 1 mi
Existing temp roads	10.3 mi	8.6 mi	- 1.7 mi
Number of Landings	219 landings	168 landings	-51 landings

Table 2-9, beginning on the following page, provides a brief summary of the alternatives and their environmental consequences in comparative format. Although there is no predictable acreage or timeframe for effects from the No Action alternative, the existing fuel load would continue to present a risk for high-intensity wildfire. Under Alternative 1, fire risk and the severity of wildfire effects to other resources would continue to increase over time.

Table 2-9. Comparison of Environmental Consequences of Alternatives by Measurement Indicator

A. Fire Behavior and Fuels			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Condition Class	CC 1 – 1,230 CC 2 – 2,687 CC 3 – 6,753 Continuing shift to CC 3	CC 1 – 4,923 CC 2 – 5,747	CC 1 – 4,421 CC 2 – 5,691
Surface Fuel Load	27 tons/acre 8-66 tons/acre range	Surface fuel reduced to an average of 10-15 tons/acre on 10,670 acres	Surface fuel reduced to an average of 10-15 tons/acre on 10,112 acres
Fire Behavior - Fire Type (Acres)	Surface - 684 Passive Crown -6,578 Active Crown - 3,408 Crown fire not reduced	Surface - 8,831 Passive Crown- 1,424 Active Crown - 415 Crown fire reduced 89% on 10,670 acres	Surface - 8621 Passive Crown - 1,138 Active Crown - 353 Crown fire reduced 89% on 10,112 acres
Fire Intensity - Flame Length (Acres)	Less than 4' - 2,424 4' to 8' – 1,914 Greater than 8' – 6,332	Less than 4' – 9,332 4' to 8' – 363 Greater than 8' - 975	Less than 4' – 8,932 4' to 8' – 426 Greater than 8' - 754

B. Forest Vegetation			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Stand Composition and Structure	Higher levels of understory shade tolerant species	Higher levels of large, widely spaced, shade intolerant species	Higher levels of large, widely spaced, shade intolerant species
Density – Basal Area (ft ² /acre)	Currently: 200 20 Years: 255	Post Treat: 147 20 Years: 195	Post Treat: 142 20 Years: 191
Density - Stand Density Index (% Max SDI)	Currently: 84% 20 Years: 99%	Post Treat: 48% 20 Years: 61%	Post Treat: 48% 20 Years: 62%
Forest Health - Dwarf Mistletoe (DMI)	Currently: 3.5 20 Years: 4.2	Post Treat: 0.8 20 Years: 1.0	Post Treat: 0.8 20 Years: 1.0
Forest Health – Insect Related Mortality Risk (% acres \geq 60% Max SDI)	Currently: 65% 20 Years: 78%	Post Treat: 33% 20 Years: 47%	Post Treat: 35% 20 Years: 53%

C. Geology and Soil Resources

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Geologic Hazards	Insignificant potential for geologic hazards; increased potential for mass movement with severe wildfire.	Insignificant potential for geologic hazards	Insignificant potential for geologic hazards
Soil Porosity and Hydrologic Function	No change; potential for slight reduction of porosity and extensive, short-term reductions in hydrologic function with severe wildfire.	Extent and magnitude of reductions would be minor and mostly long-term.	Extent and magnitude of reductions would be slightly less than Alternative 2; duration would be similar.
Effective Soil Cover	No change; with severe wildfire significant short term losses are possible over an extensive area.	Minor losses; not of an extent or magnitude that would significantly affect productivity; short term duration.	Impacts slightly less than Alternative 2; duration would be similar.
Surface and Subsurface Organic Matter	No change; potential for significant short term loss of surface organic matter and minor loss of subsurface organic matter with severe wildfire.	Minor losses; not of an extent or magnitude that would significantly affect productivity; short term duration.	Impacts slightly less than Alternative 2; duration would be similar.
Severe Burning	No change; potential for significant impacts with severe wildfire; extent would depend on fire size.	Extent of impacts would be minor and would not significantly affect productivity.	Extent of impacts would be slightly less than Alternative 2.

D. Water and Riparian Resources			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Watershed Condition	No change, high risk for future high intensity wildfire.	Reduced risk of future high intensity wildfire.	Reduced risk of future high intensity wildfire.
Stream Channel Condition	No change, 3 existing stream crossings that act as fish passage and/or sediment conveyance barriers would remain in place.	Positive effect from replacing 3 failing stream crossings with improved crossings. Project related impacts would be minor and mitigated with stream buffers and crossing installation and removal RPMs.	The 3 failing existing crossings would be replaced, and lesser other impacts would occur than with Alternative 2 because of reduced treatment acres in SEZs.
Water Quality and Beneficial Uses	No change, greater potential for water quality effects from possible future high intensity wildfire.	Sediment delivery resulting from project treatments would not be measurable above background levels with application of BMPs and project specific RPMs.	Lesser potential impacts than with Alternative 2 would result because of reduced acres of WT mechanical treatment and fewer acres of SEZ treatments.
SEZs, Floodplains, and Aspen Stands	No change, conifer encroachment will continue to compete with riparian vegetation for water and nutrients in these areas.	Effects will be minimal and short term due to soil moisture requirements for mechanical treatments, piling restrictions, and proposed adaptive management.	Effects will be slightly less than those for Alternative 2 due to fewer acres of SEZ treatment proposed.

E. Aquatic Wildlife

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Stream shade and water temperature	Not expected to change from current levels	Short-term decrease of shade with long-term increase as larger tree structure develops. No measurable increase in stream temperature.	Short-term decrease of shade, but less than Alt. 2. No measurable increase in stream temperature.
Coarse Woody Debris (CWD)	Amount of CWD will increase in the long-term.	CWD is left within stream channels per RPAs.	CWD is left within stream channels per RPAs.
Sediment	No change from current levels.	Potential increase resulting from roads and landings, but not measurable when considering background levels.	Potential increase resulting from roads and landings, but not measurable when considering background levels. Potential for sedimentation to streams is less than Alternative 2.
Lahontan Cutthroat Trout	No Effect	May Affect, but is not Likely to Adversely Affect	May Affect, but is not Likely to Adversely Affect
Known to Occur in Project Area: Lahontan Tui Chub & Great Basin Rams Horn	No Effect	No Effect	No Effect
Does Not Occur in Project Area: Sierra Nevada Yellow-legged Frog, Delta Smelt, Yosemite Toad, Northern Leopard Frog	No Effect	No Effect	No Effect

F. Terrestrial Wildlife			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Effects to Fisher and Sierra Nevada Red Fox	No Effect	No Effect	No Effect
Effects to Wolverine	No Effect	Disturbance; fine scale habitat fragmentation; reduced risk of course scale habitat fragmentation; <4% resting and foraging habitat affected; no change in acres of denning, resting, and foraging habitat.	Disturbance; fine scale habitat fragmentation; reduced risk of course scale habitat fragmentation; <4% resting and foraging habitat affected; No change in acres of denning, resting, and foraging habitat.
Effects to American Marten	No Effect	Disturbance; fine scale habitat fragmentation; reduced risk of course scale habitat fragmentation; reduction of 1,204 acres of denning habitat; reduction of 755 acres of resting habitat; reduction in 653 acres of foraging habitat.	Disturbance; fine scale habitat fragmentation, reduced risk of course scale habitat fragmentation; reduction of 948 acres of denning habitat; reduction of 522 acres of resting habitat; reduction of 419 acres of foraging habitat.
Effects to Townsend's Big-eared Bat	No Effect	Disturbance; removal of some tree hollow-type roosts; if existing	Disturbance; removal of some tree hollow-type roosts; if existing
Effects to Bald Eagle	No Effect	Disturbance; addition of 91 acres of nesting habitat; addition of 24 acres of perching a habitat; addition of 180 acres of foraging habitat.	Disturbance; addition of 32 acres of nesting habitat; addition of 24 acres of perching habitat; addition of 185 acres of foraging habitat.

F. Terrestrial Wildlife, Cont.

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Effects to Northern Goshawk	No Effect	Disturbance; Initial reduction in suitable habitats would be followed by growth of treated stands along trajectories more beneficial than current trajectories; reduction of 3,124 acres of nesting habitat; reduction of 42 acres of perching habitat; addition of 3 acres of foraging habitat.	Disturbance; Initial reduction in suitable habitats would be followed by growth of treated stands along trajectories more beneficial than current trajectories; reduction of 2,828 acres of nesting habitat; reduction of 50 acres of perching habitat; addition of 2 acres of foraging habitat.
Effects to California Spotted Owl	No Effect	Disturbance; Initial reduction in suitable habitats would be followed by growth of treated stands along trajectories more beneficial than current trajectories; reduction of 1,613 acres of nesting habitat; reduction of 1,675 acres of roosting habitat; reduction of 1,366 acres of foraging habitat.	Disturbance; initial reduction in suitable habitats would be followed by growth of treated stands along trajectories more beneficial than current trajectories; reduction of 1,356 acres of nesting habitat; reduction of 1,418 acres of roosting habitat; reduction of 1,281 acres of foraging habitat.
Effects to Great Gray Owl	No Effect	Disturbance; conifer encroachment in meadows reduced; reduction of 2,103 acres of nesting, roosting, and foraging habitat.	Disturbance; conifer encroachment in meadows reduced; reduction of 1,798 acres of nesting, roosting, and foraging habitat.
Effects to Willow Flycatcher	No Effect	Disturbance; Possible long term increase in deciduous, riparian shrubs; approximately 4% of suitable nesting, perching, and foraging habitats affected	Disturbance; Possible long term increase in deciduous, riparian shrubs; approximately 3% of suitable nesting, perching, and foraging habitats affected

G. TRPA Special Interest Species			
Species	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Northern Goshawk	No Effect	Disturbance; Initial reduction in suitable habitats would be followed by growth of treated stands along trajectories more beneficial than current trajectories	Disturbance; Initial reduction in suitable habitats would be followed by growth of treated stands along trajectories more beneficial than current trajectories
Osprey	No Effect	Disturbance; Stand condition in the disturbance zone are expected to be enhanced	Disturbance; Stand condition in the disturbance zone are expected to be enhanced
Bald Eagle (winter)	No Effect	Disturbance; slight increase in nesting, perching, and foraging habitat	Disturbance; slight increase in nesting, perching, and foraging habitat
Bald Eagle (nesting) and Golden Eagle	No Effect	No Effect	No Effect
Peregrine Falcon	No Effect	Disturbance	Disturbance
Waterfowl	No Effect	Disturbance; habitat would be improved where treatments remove encroaching conifers	Disturbance; habitat would be improved where treatments remove encroaching conifers
Mule Deer	No Effect	Disturbance; short term reduction of forage and cover; long term increase in habitat quality	Disturbance; short term reduction of forage and cover; long term increase in habitat quality
Lahontan Cutthroat Trout	Are fish species present (or suspected)?		
	Yes – LCT are known to occur in the Upper Truckee River above Christmas Valley (upper limit of the South Shore Project area).		
	Is there an adjacent Lahontan cutthroat trout population which could be affected by the project?		
	Yes – Individual LCT could migrate into the project area before implementation occurs.		

H. Management Indicator Species

MIS Habitat Factor	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Riparian Habitat: Change in Deciduous Canopy Cover	0	496 acres enhanced by reduction of understory conifers	466 acres enhanced by reduction of understory conifers
Riparian Habitat: Change in Total Canopy Cover	0	240 acres may show a reduction in total canopy cover by at least one size class.	176 acres may show a reduction in total canopy cover by at least one size class.
Riparian Habitat: Change in CWHR Size Class	0	179 acres expected to increase by at least one CWHR size class	140 acres expected to increase by at least one CWHR size class
Early and Mid Seral Coniferous Forest Habitat: Changes in CWHR tree size class	0	600 acres converted from CWHR size class 4 to size class 5	467 acres converted from CWHR size class 4 to size class 5
Early and Mid Seral Coniferous Forest Habitat: Changes in Tree Canopy Closure	0	1,728 acres reduced by at least one canopy cover class	1,538 acres reduced by at least one canopy cover class
Early and Mid Seral Coniferous Forest Habitat: Changes in Understory Shrub Canopy Closure	0	689 acres	631 acres
Late Seral Open Canopy Coniferous Forest Habitat: Changes in Tree Canopy Closure Class	0	12 acres reduced from closure class P to closure class S	12 acres reduced from closure class P to closure class S

H. Management Indicator Species, Cont.			
MIS Habitat Factor	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Late Seral Open Canopy Coniferous Forest Habitat: Changes in Understory Shrub Canopy Closure Class	0	51 acres	47 acres
Late Seral Closed Canopy Coniferous Forest Habitat: Change in Canopy Closure	0	70 acres reduced from dense to moderate	70 acres reduced from dense to moderate
Late Seral Closed Canopy Coniferous Forest Habitat: Change in Large Down Logs or Large Snags	0	Logs reduced to a minimum of 10 tons/acre on 31 acres; hazard snags greater than 30 inches dbh removed	Logs reduced to a minimum of 10 tons/acre on 20 acres; hazard snags greater than 30 inches dbh removed
Snags in Green Forest: Medium Snags per Acre	0	Medium snags reduced to below 3 per acre in the absence of larger sized snags, and not below 2 snags per acre in the presence of larger snags on 5,517 acres	Medium snags reduced to below 3 per acre in the absence of larger sized snags, and not below 2 snags per acre in the presence of larger snags on 5,376 acres.
Snags in Green Forest: Large Snags per Acre	0	Only hazard trees adjacent to established infrastructure and greater than 30 inches dbh would be removed	Only hazard trees adjacent to established infrastructure and greater than 30 inches dbh would be removed
Snags in Burned Forest Ecosystem Component: Medium Snags per Acre	0	Medium snags reduced to below 3 per acre in the absence of larger sized snags, and not below 2 snags per acre in the presence of larger snags on 315 acres.	Medium snags reduced to below 3 per acre in the absence of larger sized snags, and not below 2 snags per acre in the presence of larger snags on 315 acres

H. Management Indicator Species, Cont.

MIS Habitat Factor	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Snags in Burned Forest Ecosystem Component: Large Snags per Acre	0	Only hazard trees adjacent to established infrastructure and greater than 30 inches dbh would be removed	Only hazard trees adjacent to established infrastructure and greater than 30 inches dbh would be removed

I. Sensitive Plants

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Habitat Cover for Sensitive Plants	No change. Long term reduction possible from increased fuel loadings and potential wildfire event	No change. Long term improvement as a result of reduced fuel loading and conifer density	Same as Alt 2.

J. Noxious Weeds

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Risk of Noxious Weed Invasion	No short term increase. Long term potential increase in risk due to increased wildfire risk	Localized minor increase in risk within mechanical treatment, roads, and prescribed burn areas.	Same as Alt 2 but on fewer acres

K. Air Quality			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Fugitive Dust	No measureable increase from current levels.	Short term, temporary increase in fugitive dust from equipment hauling and thinning activities. Minimal amounts due to use of BMP and Resource Protection Measure mitigations.	Short term, temporary increase in fugitive dust from equipment hauling and thinning activities. Fewer acres of mechanical treatments leading to dust production as compared to alternative 2. Minimal amounts.
Smoke Emissions (particulate matter)	No increase in smoke particulate matter from current levels. Increased potential large release of particulate matter as a result of wildfire	Smoke particulate matter increased from prescribed burning activities. Within standards for emissions. Substantially reduces emission potential from wildfire.	Increased acres of prescribed burning activities. Negligible increase in particulate matter compared to Alternative 2. Within standards for emissions
L. Heritage Resources			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Effect to Heritage Resources	No direct impacts, but continued long term risk to cultural resources from wildfire in areas with heavy fuel loads.	Reduction of risk to cultural resources from high intensity wildland fires.	Reduction of risk to cultural resources from high intensity wildland fires, but with less acreage treated.
Reduction of Conifers in Aspen Stands	No direct impacts, but continued long term risk to arborglyphs from wildfire and conifer competition (which can threaten the health of aspens with arborglyphs.)	Protection of arborglyphs in aspen stands while reducing wildfire hazards and conifer competition. Increase health and longevity of carved trees.	Protection of arborglyphs in aspen stands while reducing wildfire hazards and conifer competition, but with less acreage treated. Increase health and longevity of carved trees.

M. Scenic Resources

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Meeting visual quality objectives (VQOs)	Consistent with VQO	Consistent with VQO. Short term deviation during and immediately after treatments	Consistent with VQO. Short term deviation during and immediately after treatments
Scenic stability	Low	High stability in treatment areas	High stability in treatment areas

N. Recreation

Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
User Created Trails	No affect to the current use patterns	Use patterns are likely to remain consistent with current conditions	Use patterns are likely to remain consistent with current conditions
Access Restrictions	No affect to the current use patterns	Short term public recreation restrictions as areas are closed during implementation for public protection	Fewer short term public recreation restrictions as areas are closed during implementation for public protection compared to Alt 2
Christmas Tree Program	No affect to the current use patterns	Short term reduction in opportunities as treatments are implemented	Short term reduction in opportunities as treatments are implemented
Recreation Experience (ROS)	No affect to the current use patterns	Short term negative affect to recreation visitor experience, no change to the ROS class	Short term negative affect to recreation visitor experience, no change to the ROS class

O. Transportation and Access (Roads)			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Change in Access	No change	Minor reconstruction and maintenance to current access. No permanent change in access.	Same as Alternative 2
P. Economics			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Present Net Value	\$0	\$-3,334,000	\$-8,674,000
Q. Special Designated Areas			
Measurement Indicator	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Preferred Alternative
Effect to Wilderness	No effect to wilderness	No effect to wilderness	No effect to wilderness
Change to Roadless Character	No change to roadless character	Minimal hand and mechanical treatment adjacent to homes and highways. No change to roadless character.	Minimal hand and mechanical treatment adjacent to homes and highways. No change to roadless character.